DOCUMENT RESUME

ED 472 772 EF 006 200

AUTHOR	Davis, Ben
TITLE	Healthy Schools for Healthy Kids. A Parents' Guide for Improving School Environmental Health.
INSTITUTION	Vermont Public Interest Research Group, Montpelier.
SPONS AGENCY	Environmental Protection Agency, Boston, MA. New England Regional Office.
PUB DATE	2001-08-00
NOTE	68p.
AVAILABLE FROM	Vermont Public Interest Research Group, 141 Main St., Suite 6, Montpelier, VT 05602. Tel: 802-223-5221. For full text: http://www.vpirg.org/ downloads/Healthy_Schools.PDF.
PUB TYPE	Guides - Non-Classroom (055)
EDRS PRICE	EDRS Price MF01/PC03 Plus Postage.
DESCRIPTORS	Air Pollution; Educational Facilities Improvement; Environmental Standards; Hazardous Materials; Indoor Air Pollution; Parent Materials; *School Buildings; Ventilation
IDENTIFIERS	*Environmental Health; Vermont

ABSTRACT

Asserting that few people recognize that concentrations of toxic pollutants are often many times higher inside buildings than outdoors, this guide offers advice on improving school environmental health in Vermont. Its chapters are: (1) "Indoor Air Pollution is a National Problem"; (2) "School Environmental Health in Vermont"; (3) "Act 125: The School Environmental Health Bill"; (4) "Health Implications of School Indoor Air"; (5) "The Precautionary Approach to School Environmental Health"; (6) "Getting the School Community Involved"; (7) "Basics of Indoor Air Quality and School Environmental Health"; (8) "Evaluating Products for Health and Environmental Impacts"; (9) "Pesticides"; and (10) "General Guidelines." (Appendices contains the School Environmental Health Act, an environmental health audit form, and the draft school diesel idling policy for Vermont schools. Contains 82 references.) (EV)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 472 772

Healthy Schools for Healthy Kids

A Parents' Guide to Improving School Environmental Health

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
Susanne Miller
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

Vermont Public Interest Research Group
141 Main St. Suite 6 Montpelier, VT 05602 802.223.5221
www.vpirg.org

Full text available at:
http://www.vpirg.org/downloads/Healthy_Schools.PDF

EF 006 200

BEST COPY AVAILABLE

Healthy Schools for Healthy Kids

Organize and involve the whole community in the health of the school

Clean and healthy school buildings are a shared community responsibility. Get people talking and working together to ensure a healthy learning space for children in your community. See page 23, *Getting the School Community Involved.*

Do a School Environmental Health Audit

Take a walk through the school as the first of many regular environmental health audits of school buildings. Participants should include custodians, teachers, administrators, the school nurse, parents and students. Look for ways to make the building and grounds more child-health friendly. Keep the community informed. Involve students.

A few easy to implement precautionary steps that can make a big difference for children:

- ☐ Define walkways to keep students on concrete and off bare dirt prior to entry in the school.
- ☐ Install outdoor grates to catch snow and mud.
- ☐ Increase the use and vacuuming of walk-off mats in all entryways to catch soils and particulates at the building perimeter, while reducing dusting and mopping needs in the building interior.
- ☐ Save future dusting by using triple walled vacuum cleaner bags.
- ☐ Vacuum carpets thoroughly at least three times per week.
- ☐ Examine all chemical maintenance products, assemble and review MSDS sheets, and implement a process to identify and phase in least-toxic supplies.
- ☐ Replace aerosols with cleansers dispensed out of lower cost trigger sprayers.
- ☐ Eliminate bleach from cleaning applications. While bleach is a powerful and inexpensive sanitizer, it is a poor cleaner and a highly dangerous and irritating product.

Initiate a process for purchase, use and disposal of chemicals, art and lab supplies. Material Safety Data Sheets should be reviewed. Clear plans should be made to return or dispose of unwanted, waste, or excess materials.

Make use of the Internet to access up-to-date information. Extensive links to school environmental health websites can be accessed through www.vpirg.org and from the Vermont Department of Health's new Act 125 School Environmental Health Web Site at www.state.vt.us/health and from the U.S. Environmental Protection Agency **Tools for Schools Program: Indoor Air Quality (IAQ) Tools for Schools Kit** at www.epa.gov/earth1r6/6pd/toolsforschools/tools4u.htm

Healthy Schools for Healthy Kids

A Parents' Guide to Improving School Environmental Health

Vermont Public Interest Research Group

141 Main Street, Suite 6
Montpelier, VT 05602
802.223.5221

vpirg@vpirg.org ❖ www.vpirg.org

A Parents' Guide to Improving School Environmental Health

Healthy Schools for Healthy Kids was written by Ben Davis, VPIRG Environmental Health Organizer. Mark Floegel, Stacy Heuer, Jim Higgins, Sarah O'Brien and Anthony Pollina provided contributions and editing. Special thanks to Stephen P. Ashkin of Seventh Generation and Board member of the Healthy Schools Network for training in how to conduct school environmental health audits.

About VPIRG

The Vermont Public Interest Research Group is Vermont's largest environmental and consumer organization. VPIRG engages in research, community organizing and policy making in the public interest – from health care to the electric utility industry, from environmental toxics to suburban sprawl, from accountable government to deformed frogs. Founded in 1972, VPIRG has grown to include 20,000 members across Vermont and other states.

VPIRG relies on the generosity of individuals for two-thirds of its budget. For information about membership or VPIRG's other work, contact the VPIRG office at 141 Main Street, Suite 6 Montpelier, VT 05602 (802) 223-5221. Tax deductible donations can be made to the Vermont Public Interest Research and Education Fund at the same address. Information is available at VPIRG's website: www.vpirg.org.

Funding for the VPIRG's *Healthy Schools for Healthy Kids* was provided by the U.S. Environmental Protection Agency through an Environmental Justice Grant administered by USEPA Region 1 Boston, MA.

BEST COPY AVAILABLE

TABLE OF CONTENTS

Helpful Hints 2

Preface 6

Chapter 1. Indoor Air Pollution is a National Problem 7

Chapter 2. School Environmental Health in Vermont 9

Chapter 3. Act 125. The School Environmental Health Bill 12

Chapter 4. Health Implications of School Indoor Air 14

Chapter 5. The Precautionary Approach to School Environmental Health . 20

Chapter 6. Getting the School Community Involved 23

Chapter 7. Basics of Indoor Air Quality and School Environmental Health ... 26

Chapter 8. Evaluating Products for Health and Environmental Impacts .. 36

Chapter 9. Pesticides 40

Chapter 10. General Guidelines 46

Chapter 11. Conclusion 49

Glossary 50

Information resources 53

Appendix A. Act 125, The School Environmental Health Act 58

Appendix B. Environmental Health Audit Form 61

Appendix C. Draft School Diesel Idling Policy for Vermont Schools 64

References 65

Preface

Keeping our school environment healthy and clean is the key to a productive learning space where children can reach their full potential. Poor indoor air quality undermines the most engaging curriculum and the best efforts of teachers and staff. It causes kids to lose concentration and often to miss school altogether.

Our children, along with the whole school population - custodians, staff, bus drivers, teachers and administrators - are exposed all day, every day to a wide array of hidden, and not so hidden hazards. National experts admit that schools are one of our most hazardous indoor environments. And, though we work hard to combat pollution in our outdoor environment, we do little to clean up the environment in which our kids spend most of the time.

And every day students, teachers and staff do miss school or are less productive because their health is affected by exposure to contaminants in the school environment. Exposures like:

- Carcinogenic diesel fumes penetrating school buildings
- Water, snow, mud and dust tracked in, bringing petroleum, lead, pesticides and moisture
- Molds and bacteria breeding in carpets, ceilings and walls
- Fumes from toxic chemicals in art supplies, chemistry labs and cleaning materials
- Neurotoxic pesticides used inside and outside the school
- School renovations, often happening during school hours, spreading noise, dust and fumes
- And poor, and sometimes no, ventilation limiting fresh air, circulating contaminants and worsening school environmental health problems.

As a nation, we have been slow to recognize how our children's health is affected by this daily exposure to common contaminants. And Vermont lags behind other states in developing a systematic approach to the problem. We do know that every day of inaction means even greater expense for clean up and repair. We also know that a community response can be both positive and effective. North Country Union High School, in Newport, Vermont confronted harmful chemical exposures throughout the 1990's. Now, after an exhaustive but energizing process, the school is an example for other Vermont schools.

What about the rest of Vermont's schools? Most are trying, some are succeeding, and all can do more. Act 125, the new Vermont Healthy Schools legislation, will help. It directs the Health Department to set up a web based information clearinghouse making the latest information available to every Vermont school. But, many communities can't and shouldn't wait. Excellent resources, like the EPA's Tools for Schools, are well tested and effective. Other states have useful resources for improving school environmental health and there is much you can learn from the experience of others.

Ultimately, every Vermont child deserves a healthy, clean school environment. And, while the process of getting there will vary school to school, the best response comes when the whole community works together.

VPIRG's school environmental health action guide can help you get started – today.

Anthony Pollina,
Vermont Institute for Environmental Health
Consultant, Vermont Public Interest
Research Group

December, 2000

BEST COPY AVAILABLE

Chapter 1. Indoor Air Pollution is a National Problem

For years people have recognized damage to health can occur as a result of pollutants pumped into the sky, and many laws have aimed to stem outdoor air pollution. Now, Americans spend most of their time indoors, yet few recognize that concentrations of toxic pollutants are often many times higher inside buildings than outdoors. Indoor air pollution is among the highest environmental risks to people of all ages.[1]

Tight buildings trap pollutants, increasing concentrations

The World Health Organization (WHO) estimates 30 percent of newly constructed or remodeled buildings have problems with indoor air quality.[2] Because newer and renovated buildings tend to be "tighter" (i.e. have less ventilation) than older buildings, contaminants can more easily concentrate to levels where occupant health is affected. A 1989 Massachusetts report blamed indoor air pollutants for half of all illnesses and a subsequent study by the National Institute of Occupational Safety and Health (NIOSH) found inadequate ventilation in over half of America's buildings.

Exposure to indoor pollutants can be 100 times higher than outdoors

Studies by the U.S. Environmental Protection Agency (EPA) have shown exposure to indoor air pollutants is normally two to five times higher than exposure to the same pollutants outdoors and can be as much as 100 times higher. Also, new and renovated buildings trap volatile gases coming from paint, carpets and furniture.[3,4]

Poor air quality in schools is widespread

The U.S. General Accounting Office (GAO) reports 46 percent of American schools have problems with indoor air quality or ventilation systems.[5] It found HVAC (heating, ventilation, air conditioning) systems are the single building feature most frequently reported as needing repair.[6] The U.S. General Accounting Office (GAO) reports schools typically have four times as many people in a given amount of space as office buildings. Federal air quality standards for schools (or any other non-industrial indoor environment) are still being developed, and industrial standards are not reasonably applicable to a school environment.[7]

Solving the school environmental health problem can be costly

The GAO estimates it will ultimately cost billions of dollars to restore air quality in America's schools. In many Vermont towns, school improvements necessitated by air quality problems will continue to require passage of bond votes upwards into the millions of dollars in larger schools.[8]

Cure costs less than the disease

Not addressing indoor air pollution is even more costly. The National Academy of Sciences estimates health costs associated with indoor air pollution are $15 to $100 billion each year.[9] Health magazine reported in 1990 that sick-building syndrome results in 150 million lost workdays each year. Fuel costs saved in energy-efficient buildings with poor air quality is wasted several times over in absenteeism.[10]

By law, children must be safe from environmental health dangers in school

School administrators not only have an ethical obligation to protect children from health hazards in school buildings, but a legal one. In 1992, the U.S. Court of Appeals

for the fifth circuit ruled compulsory-attendance laws place children into the "functional custody" of school officials while school is in session and therefore administrators "have a duty to protect schoolchildren from hazards of which the school officials know or should know." Under the federal Education for All Handicapped Children Act (20 USC, #1401 et seq.), school districts are also required to recognize environmental illness as a handicap and make arrangements for afflicted students to receive instruction in an environment free of debilitating contaminants.[11]

WHAT ARE THE ENVIRONMENTAL HEALTH EXPOSURES AT SCHOOL?

Brought in from the outside every day

Sources of poor indoor air quality include outside sources –

- Tracked in dust and pesticides.
- Industrial emissions.
- Building exhaust fans are often close or upwind of fresh air intakes.
- Automobile and school buses idle close to buildings, and fumes are drawn inside as doors open and shut.

Released from inside every day

Many rooms and buildings are poorly ventilated resulting in CO_2 levels from breathing high enough to impair concentration and alertness. Other sources of indoor pollution include:

- Dust and dirt in heating and ventilation systems.
- Venting of furnace gases into air ducts.
- Dust and gases from photocopiers, computers, and printers can concentrate in poorly ventilated spaces.
- Maintenance products – disinfectants, cleansers, pesticides, solvents, fragrances, paint, caulk or carpet glues – release volatile organic vapors into the breathing zone.
- New furniture and floorings off-gas volatile components for months after installation.
- Molds and spores thrive in water-damaged furniture and carpets.
- Occupants of the building are a source of communicable diseases, chemical fragrances, emissions from assorted trash tossed in trashcans and pet dander from pets at home.[12]

BEST COPY AVAILABLE

Chapter 2. School Environmental Health in Vermont

A 1995 U.S. General Accounting Office (GAO) study found over 25% of the responding schools in Vermont had poor indoor air quality and over 32% had inadequate ventilation systems.[13]

Mike Rogers of the Environmental Protection Agency, after two years on loan to the Vermont Department of Health helping schools address indoor air quality problems, said, "I worked with dozens of Vermont schools on indoor air quality problems. Some were very bad, some were minor, but every school, without exception, had room for significant improvement."

Vermont report confirms Federal findings and recommends improvements

The 1999 report of the Vermont Committee on Indoor Air Quality in Schools found "in virtually all of the schools visited some problems were discovered that reasonably could be linked to adverse health effects." Poor school air quality was linked to old buildings with inadequate ventilation systems, buildings built to meet funding limits rather than functional requirements, deferred maintenance, excessive attempts at energy cost savings, construction and renovation, and harmful emissions from new building materials and maintenance chemicals.[14]

Vermont children are missing school due to school air related illness

Over 10,000 Vermont children have asthma and many have difficulty breathing while in school. According to the Vermont Chapter of the American Lung Association, asthma is the leading cause of absenteeism for Vermont students.

Throughout Vermont, schools grapple with environmental health

During the 1970s and 80s, many Vermont school districts were suffering from indoor air and environmental health complaints. A federal survey of Vermont schools found half of the respondents with problems. A sample:

Barnet Elementary School

An odor problem that closed the Barnet school in 1998 was traced to a school wide rodent infestation. As many as 800 rodents were estimated to be living in the wall and ceiling insulation. Their presence, coupled with faulty ventilation in the five-year-old building led to extensive renovation to correct the problem.

Blue Mountain Union School

In response to complaints by students and staff, air testing at Blue Mountain found high levels of CO_2, and health complaints stemming from water damage to ceilings and carpets. In January 1994, Anderson Laboratories of Dedham, MA reported that ventilation in the school was inadequate, a variety of air contaminants were affecting occupants, and air in several sections of the building was "seriously polluted".

In the summer of 1998, a $4.8 million bond was passed to renovate the school. Three-quarters of the school was gutted and reconstructed. A wood chip hot water heating system was installed. Two air handlers were put in, and rooftop air conditioners were installed for the offices and library. The entire system is monitored and adjusted from a single console. There is plenty of air moving throughout the building now.

Other innovations to improve indoor environmental health: The air handling unit is programmed to shut down when school

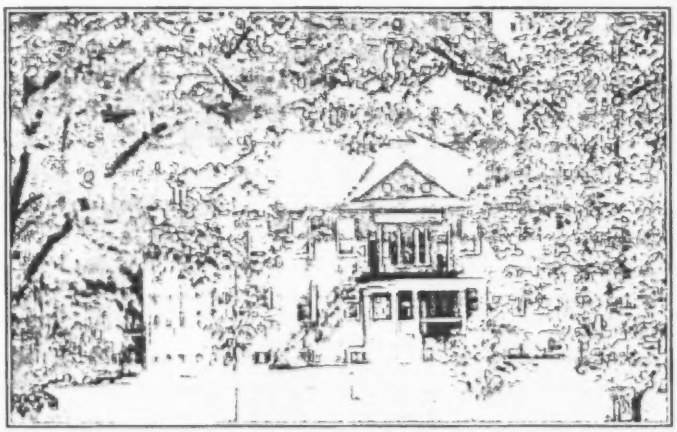
buses arrive and restart ½ hour after they have left. In addition buses shut off motors while waiting for kids. Carpeting in the school has been reduced to 20% of floor space. 18' walk-off mats are standard at every entrance into buildings

Hartland Elementary

Staff at Hartland Elementary reported repeated headaches, nausea and dizziness. An inspection of the school found sewer gas being drawn into the building.

Middlebury Union High School

The Rutland Daily Herald reported in the fall of 1992, Middlebury Union High School was forced to close two classrooms when a leaking roof led to a mold outbreak. At the same time, voters rejected a bond proposal to renovate the building.[15] By the fall of 1997, the school was improving its ventilation system and installing a pitched roof.



Missisquoi Valley Union High School

Poor ventilation, a leaking roof and too few windows led two teachers who could no longer physically tolerate air conditions in the building to resign. The schools principal reported he could stay in his office for no more than 15 minutes due to poor air quality.[16]

North Country Union High School

In the 1990s, following harmful chemical exposure to staff and an incident in which a student was carried from the building due to school induced chemical sensitivity, North Country Union High School in Newport went through an exhausting and divisive fight to improve air quality conditions in the school. After two staff members prevailed in a "sick building syndrome" lawsuit against the school, the community approved a bond issue to improve ventilation. The process ultimately energized the community and brought about school-wide air quality improvements. North County Union now leads Vermont schools in awareness, action and school policies related to improving school environmental health.

Shelburne Community School

In 1999, VPIRG was approached by a parent volunteer in the school to look for ways to reduce potential harmful exposures following complaints by teachers about carpet cleaning chemicals. With full support of school administration, VPIRG undertook a school environmental health audit of the school and presented findings to staff and the school board. A number of steps were implemented and a process begun to ensure environmental health issues be considered as part of all building management decisions.

A CASE STUDY—UNION-32, EAST MONTPELIER, VT

Union 32 Junior-Senior High School was created in the early 1970s by combining five area school districts. Despite design and construction as an "open classroom" school, walls to separate the classrooms were going up within a decade. Program needs proceeded without air quality considerations. Ventilation and air contaminant problems became widely recognized by staff and students. Administrators, although concerned, tended to isolate complaints and incidents of exposure, slowing a reckoning of air quality complaints.

Overcrowding contributed to air quality problems

Overcrowding was a serious contributor to increased exposure to poor air. Designed for seven hundred students, the building bulged with 200 extra students by the 1990s. Classrooms were overcrowded and poorly ventilated. Converted closets and the bus garage were pressed into classroom use.

Remodeling led to new air quality complaints

In the summer of 1992, substantial remodeling was begun. Two large open classrooms were divided into three rooms each and two corridors built to access them. Students arrived in the fall as carpet was being laid and paint was still wet on the walls. Off-gas fumes were strong and students and staff suffered headaches and felt ill.

Students took the initiative to document problems, resulting in improvements

In 1992 Dr. Craig Scharf and advanced biology students collected information on air quality and documented an array of concerns. With unanimous support by school staff, the students presented findings to the school board in the spring of 1993. A subsequent report by a professional firm hired to assess the school echoed the U-32 student report. Small rehabilitation projects were begun, such as opening windows and removing small areas of carpet, and complaints decreased.

Limited resources led to limited success in solving U-32's problems

Despite improvements, cost cutting on maintenance allowed continued deterioration of air quality. Serious ongoing problems with the heating and ventilation system led to a bond issue to enlarge the school and overhaul the ventilation system. The bond initiative failed.

Slow journey to improvement

The U-32 School Board continued to address the building's air quality problems with the resources at its disposal. In 1996-97, an engineering assessment of environmental problems and potential remedies concluded serious problems remained unresolved.

Voters approved a $12.6 million bond issue in the spring of 1997. Extensive rehabilitation work took place during breaks and summer vacation. Expansion, ventilation system overhaul, and improved natural lighting means nearly a thousand students, parents and staff have a healthy learning place.

Renew U-32: a model on the road to improvement

Dubbed *Renew U-32*, the bond improvement process creates a model other Vermont schools can learn from:

- Continual student, parental and community involvement brought out local expertise and meant ongoing community support for improvements.
- Carpets were removed and replaced with linoleum and tile.
- Maintenance products have been selected to be environmentally low impact.
- Full spectrum lighting is installed in enclosed spaces.
- The ventilation system is controlled from a single console and instantly adjusted to meet ventilation needs of shifting student populations during the day.
- A no-idling policy for diesel delivery vehicles is in effect.
- School buses pick up and discharge students away from the building to minimize emissions entering the building.
- The flexibility to move students around as needed has reduced crowding, despite a student population of 850 and a staff of 100, and hundreds of parents.
- Recognition that a healthy school is the best learning environment for kids has underlain all community efforts to improve environmental health in U-32.

BEST COPY AVAILABLE

Chapter 3. Act 125. The School Environmental Health Bill

The 1999 Vermont School Air Quality report made many recommendations about how Vermont schools could improve air quality. A mechanism to implement improvements everywhere in Vermont passed from growing awareness to legislative action with the introduction and passage of the Healthy Schools Bill.

Act 125. An Act Relating to Toxic Materials and Indoor Air Quality in Vermont Public Schools passed the Vermont Legislature and was signed into law on May 17th, 2000.

Act 125 sets the stage for cleaner schools

Act 125 will assist towns as they work toward providing health friendly buildings and grounds. Act 125 puts towns in control of their own school air. Vermont school districts and towns will have equal access to up-to-date information on resolving school health related dilemmas. Department of Health personnel will expand efforts to help schools resolve school environmental health dilemmas.

School Environmental Health Information Clearinghouse

Now operational, the school environmental health clearinghouse on the Department of Health's Internet site includes information on:

- A model school environmental health policy and management plan developed by the statewide Act 125 advisory panel.
- Up-to-date information on environmental health issues related to indoor air.

This information will be aimed at schools but be available to day care centers, nursing homes, public facilities and to the public at large.

- Methods to reduce or eliminate exposure to potentially hazardous substances in schools, including information on:
  - Potential health problems associated with these materials, with specific reference to children's vulnerability.
  - Integrated pest management and alternatives to chemical pest control.
  - Materials and practices in common use in school operations and construction that may compromise indoor air quality or negatively impact human health.
  - Preventive management options, such as ventilation, equipment upkeep, design strategies, and performance standards.
  - Purchasing nontoxic or least-toxic office and classroom supplies, maintenance and cleaning chemicals, building equipment, and materials and furnishings.
  - Environmental health criteria that schools may use as a decision-making tool when determining what materials to purchase or use in school construction or operations.

Students thank legislators for voting the Healthy Schools Bill out of the House Education Committee (Spring 2000).

Other features of Act 125 include:

- Charging the Vermont Health Department to work with the public, and the Department of Education, and the Department of Buildings and General Services to develop a model school environ-

mental health policy and a model school environmental health management plan. All information will be available through the information clearinghouse for schools to adapt to their own circumstances as they move toward creating a healthier school environment.

- School environmental health training workshops for school environmental health coordinators and school administrators, as well as annual training for school maintenance and custodial staff.
- Providing information and referrals to members of school communities who contact the school environmental health clearinghouse with hazardous exposure and indoor air concerns.
- Helping elementary and secondary schools in Vermont to establish comprehensive school environmental health programs to address indoor air and hazardous exposure issues.

Involved parents will be the key to full implementation of Act 125

To improve school conditions and protect our children's health, concerned parents and community members around the state need to make sure the new information system is developed to its full potential. The best way to do this is to make use of the system and provide feedback to your school and the health department.

Whether just tracking your child's physical reaction to the school environment or coming to meetings to discuss concerns, serving on a school environmental health committee, doing a school audit, checking in on the school environmental health website or actively engaging the Vermont Department of Health, the role of parents is pivotal to improving children's breathing space in school.

Good air quality in schools is a community responsibility

The activity of each building occupant has an impact on the indoor environment. Maintaining a healthy environment requires participation of everyone using the building. Where it has worked, students, staff, parents and visitors have worked together to ensure participation in a process of "shared responsibility".

Introduction to EPA's Tools for Schools

EPA's Indoor Air Quality Tools for Schools Kit is helping to reduce health risks from harmful exposures at many schools across the country.

The Indoor Air Quality (IAQ) Tools for Schools Kit

EPA's updated action kit includes checklists for all school employees, a flexible step-by-step guide for coordinating the checklists, and Indoor Air Quality Problem Solving Wheel, a fact-sheet on indoor air pollution issues, and sample policies and memos.

For more information see http://www.epa.gov/iaq/schools/tools4s2.html

The *IAQ Tools for Schools* Kit, individual IAQ Problem Solving Wheels, and Taking Action and Ventilation Basics Videos are available free of charge and can be obtained by calling 1-800-438-4318. Information available at http://www.epa.gov/iaq/iaqinfo.html

Taking Action & Ventilation Basics Video [EPA 402-V-98-001] Taking Action and Ventilation Basics Videos are available free of charge and can be obtained by calling 1-800-438-4318.

Chapter 4. Health Implications of School Indoor Air

Children are most at risk from poor air quality

During their school years, children's nervous, immune, reproductive and respiratory systems all grow and develop significantly. In the nervous system, connections between regions of the brain are formed during these years. A child's normal growth pattern can be altered and/or the growth of unwanted cells can be stimulated by exposure to chemicals. Studies of a wide variety of chemicals found in indoor environments indicate that future learning ability may be compromised from hazardous exposures at school.[17]

Children are not little adults

"The health risk from air pollution is as much as six times greater for children than for adults," said Robert Phalem, director of the University of California's Air Pollution Effects Laboratory.[18] A child's metabolic system is often unable to break down and excrete many toxic substances, increasing the likelihood of immune system impairment, neurobiological problems and cancer. Children are more inclined to engage in hand-to-mouth activity, lie on carpets or roll in the grass, increasing their chance of being exposed to toxic chemicals.[19] While children have the same multiple exposures as adults through food, water and air, they have fewer pounds of body weight with which to process the pollutants they ingest.

Early exposures can mean a lifetime of weakened immune response

Exposure to chemicals that disrupt hormone function can lead to a lifetime of suppressed immune responses.[20] When children's immature immune systems are exposed to years-long exposure to toxics at school they may be cumulatively affected to the point that immune response becomes compromised.

Lungs are often the first place affected by poor air quality

Some airborne toxics attach themselves to membranes in the respiratory tract. Constant exposure to toxic chemicals in youth leads to diminished lung capacity and function, accelerated aging of the lungs, higher rates of chronic lung disease (bronchitis and emphysema) and lung cancer. Since particulate standards were last revised in 1996, over 500 new scientific studies on particulates alone confirm the relationship between particulate air pollution and illness, hospitalization and death.[21]

Adolescent health and the school environment

Exposure to toxic materials can result in a wide variety of effects depending on the dose and the time in the child's life span when exposure occurs. Because of the distinctive biology of adolescence, multiple complex exposures open windows for unique effects of harmful substances:[22]

- Maturation of a number of organ systems occurs during this period, including not only the reproductive system but also the respiratory, skeletal, immune, and central nervous systems.
- Adolescence is a time of increased risk for infectious disease and accidental injury, making the effects of toxicants on the immune and central nervous systems particularly harmful.
- Increased food intake associated with rapid adolescent growth raises exposure to food contaminants, such as pesticide residues.
- Voluntary drug consumption—including drinking, smoking, substance abuse, and the use of off-the-shelf, prescription, and performance-enhancing drugs—increases.
- At the same time, many adolescents are introduced to toxicants in the workplace.

Asthma

Asthma is an immune system disease affecting the lungs

Asthma, or reactive airway disease, is a chronic disease of the immune system characterized by increased sensitivity in the airway, sporadic attacks of shortness of breath, wheezing and coughing. In an asthma attack, the immune system overreacts to the presence of an external agent. The bronchial tubes (connecting the throat and lungs) become inflamed, produce excess mucus, and may constrict by muscular spasm. The asthmatic feels as if he or she is drowning for lack of air, which is in fact the case.[23]

Asthma can develop after a reaction to a specific agent (allergen) and may cause a life-threatening situation within a very short period of exposure. It can also develop after a long-term exposure to irritating agents that cause an inflammation in the airways in the absence of an allergen.

Asthma is the leading cause of missed school days

Asthma is on the rise in the United States and is increasing in many countries around the world. From 1982-96, prevalence of asthma increased in the U.S. by 49%. For children under 18, the rise was 78.6%. Deaths from asthma increased by 31% between 1970-80.[24] In 1990, asthma killed 4,000 people in the US and cost $6.2 billion in time lost from work and school.[25] In inner cities, asthma is the leading cause of hospitalization among children ages 5 to 15.[26] Asthma is the leading cause of school absenteeism nationwide and in Vermont.[27]

Everyday exposures can be asthma triggers

Many environmental agents have been shown to be associated with the increased incidence of childhood asthma. They include presence of mold, viruses, cigarette smoke, allergens, cat dander, outdoor as well as indoor air pollution, cooking fumes, diesel school bus emissions and cockroach and other insect droppings.[28]

Once sensitized, asthma attacks are easily triggered

Once a person develops asthma, a severe coughing attack can be triggered by any one of a number of pollutants or irritants in the air, including compounds not previously irritating. Asthma attack triggers include dust mites, molds, tobacco and wood smoke, chemical fumes, aerosols, perfumes and pets.[29]

Increase in outdoor and indoor pollutants tied to increase in asthma

The increase in asthma in industrialized nations may be due to increasing pollutant levels in both outdoor and indoor environments, triggering stronger reactions from our immune systems. The human immune system may respond to a new presence in the environment and then overreact to common substances like dust or perfume.[30]

Multiple Chemical Sensitivity

Chemical exposure results in a variety of health effects

Multiple chemical sensitivity (MCS) is a syndrome triggered by exposure to chemicals, and experienced as a wide range of physical and mental symptoms. MCS can involve both acute (short-term) and chronic (long-term) health problems. Typical symptoms include prolonged fatigue, memory difficulties, dizziness, lightheadedness, difficulty concentrating, depression, lethargy or grogginess, loss of motivation, tense or nervous feelings, shortness of breath, irritability, muscle aches, joint pain, headaches, head fullness or pressure, chest pains, difficulty focusing eyes, and nausea.[31]

MCS is recognized as a disability

The National Research Council has now accepted that "sick building syndrome" is a real phenomenon, producing MCS-like symptoms. The Americans with Disabilities Act also recognizes MCS as a disabling health syndrome and requires workplace accommodations for its sufferers.

MCS: Toxicant-Induced Loss of Tolerance

Researchers Nicholas Ashford and Claudia Miller have suggested MCS is not the best name for this family of ailments because it fails to reflect the importance of the initiating chemical exposure. They suggest Toxicant-Induced Loss of Tolerance (TILT) better describes the true nature of the illness(es) initiated by a toxic exposure which leads to the loss of tolerance for common chemicals.[32] Different initiating events may give rise to somewhat different ailments, all of which cause sensitivity to chemicals—just as different infectious diseases can all cause a fever.

Following sensitization, symptoms are triggered by minute chemical exposures

MCS seems to be a disease (or family of diseases) occurring in two stages. Initiation of MCS is associated with a high exposure (for example, a chemical fire, or spill) or by repeated moderate exposure to pesticide residues, household cleaners, glues and emissions from carbonless copy paper, solvents or other strong chemicals such as those found in chemical dumps or used in remodeling homes or offices, (including new carpeting).

After the initiating exposure, symptoms are then triggered by extremely low exposure to many different chemicals, often out of proportion to the size of the stimulus.[33] Examples of triggers include fragrances, carpet off gassing, tobacco smoke, pharmaceuticals or foods. Not everyone exposed to chemicals gets MCS, just as not everyone stung by a bee goes into anaphylactic shock.

Sensitivity to synthetic chemicals is widespread

MCS has been recognized by its symptoms for 50 years because MCS sufferers in many geographical areas, researchers studying them and doctors treating them, have reported a consistent picture of disease. In various surveys, 15% to 30% of Americans (37 to 75 million people) report they are unusually sensitive or allergic to certain common chemicals such as detergents, perfumes, solvents, pesticides, pharmaceuticals, foods, or even the smell of dry-cleaned clothes. An estimated 5% (13 million people) have been diagnosed as being especially sensitive. Many of these people react so strongly that they can become disabled from very low exposures to common substances.

Chemical exposure and learning disabilities

Many chemicals widely used by industry and commonly found at home and in school are harmful to the developing brain and can cause developmental disabilities including behavioral and learning disabilities, hyperactivity, attention deficit, lower IQ and motor skill impairment.[34]

Epidemic of learning disabilities

An epidemic of developmental, learning and behavioral disabilities has become evident among children.

An increase in attention deficit hyperactivity disorder can be measured by the explosive prescription rate of the drug Ritalin—even accounting for the possibility of over prescription (the number of children taking Ritalin has roughly doubled every 4 to 7 years since 1971).

Animal and human studies demonstrate that many chemicals commonly encountered in industry and the home are developmental neurotoxicants that can contribute to develop-

mental, learning, and behavioral disabilities.

Children are not exposed to chemical contaminants one at a time. Hundreds of thousands of chemicals are circulating in the environment—most are poorly understood, and many readily combine with other harmful compounds to exert unknown effects on the developing brain.

Estimates of Children Likely Affected

The U.S. Census Bureau estimates that 12 million U.S. children (17% of all children) suffer from one or more developmental, learning, or behavioral disabilities. The National Academy of Sciences recently estimated that about 3% of developmental and neurological defects in children are caused by exposure to known toxic substances—including drugs, cigarette smoke, and known developmental and neurological toxins like lead, PCBs, and mercury. This means that 360,000 U.S. children (1 in every 200 U.S. children) suffer from developmental or neurological deficits caused by exposure to known toxic substances.[35]

Pesticide exposure

In addition to the well-understood effects of neurotoxic insecticides on the child's growing nervous system, other pesticides, such as herbicides and fungicides can play havoc with still developing immune and endocrine systems, preventing children from reaching their full potential.

Lead exposure

Exposure to lead has been associated with an array of permanent neurodevelopmental effects, including attention deficits, decreased IQ scores, hyperactivity, juvenile delinquency and crime.[36,37] Research has also shown an association between slightly elevated blood lead levels in children at the age of 24 months and lower general cognitive function at 5 years of age.[38] According to the US EPA, reduced cognitive ability from lead exposure as measured by IQ scores and valued in terms of foregone earnings, is estimated to be about $9600 per IQ point lost.

Solvents

Many solvents used in adhesives, paints, resins, plastics, dying and printing materials, such as inks act as depressants of the central nervous system which can result in headaches, nausea, dizziness drowsiness, memory impairment, and muscular weakness, any of which can interfere with concentration and learning. Elimination or substitution of solvents with something less harmful is the first priority. Cleaning solvents can often be replaced with simple water and detergent solutions. Water-based paints can be used in place of solvent-based paints and vegetable-based inks in place of solvent-based inks[39].

Sick Building Syndrome

Sick building syndrome (SBS) refers to health complaints by building inhabitants relating to indoor pollutants. Symptoms are highly variable and may include eye, skin, and upper airway irritation, headaches, fatigue, dizziness, runny nose, sore throat, allergies, asthma, dry skin, depression and other complaints. Dust and common allergens may be a significant factor in SBS.[40] Symptoms typically resolve when affected individuals leave the building.[41]

Biological Air Pollutants—mold, pollen, viruses

Mold

Health implications of mold

In humans, some of the fungi normally present on, or in, our bodies only cause a problem when the bodily defenses that control them are weakened or damaged.

When inhaled, mold spores or pieces of mold may cause allergic reactions in the nose, throat and eyes. Because they are small, mold spores may reach the lungs and bring on asthma-like symptoms.

Buildup of mucus, wheezing and difficulty in breathing may result.[42]

In extreme cases, biological indoor air pollution can lead to life threatening respiratory diseases, such as Legionnaires disease, hypersensitivity pneumonitis, and less-severe lung infections. These have all been linked to occupancy in damp buildings or homes with mold growth on water-damaged carpets, walls and furnishings or standing water in ventilators and humidifiers.[43]

High mold levels can affect school performance

Apart from respiratory symptoms, studies demonstrate that the presence of high mold levels induces general symptoms including fatigue, headache, and effects on the central nervous system.[44] These health impacts interfere with students' day-to-day learning ability.

Pollen

Allergy symptoms from pollen result from an immune system reaction that occurs only in people sensitized to pollen, and not in others. Pollen in the air is inhaled. Pollen grains landing in the lining of the nose or the lining of the bronchial tubes trigger cells in the nose or in the lower airway to produce a number of inflammatory compounds. These compounds cause the inflammation and the allergic reaction.

People with pollen allergies often develop sensitivities to other allergy troublemakers that are present all year, such as dust mites. For these allergy sufferers, the sneezing season extends all year. Filter changes on the ventilation system can be structured around the months when pollen counts are highest. Increased vacuuming of carpets during high pollen months may also help reduce the number of complaints.[45]

Viruses

Viruses move in and out of schools with every student and staff member. Although exposure to common viruses is a normal part of childhood immune system development, our modern transportation systems make it easy for new viruses to spread quickly throughout the world. Overcrowding and poor ventilation combine with children's less-than-adequate sanitary habits to facilitate viral transmission in schools. Although less of a factor than direct transmission in infection cycles, long-lived and dormant viral particles may persist in carpet dust for months.

Health effects of carpets

A recent preliminary study by Anderson Labs found that mice exposed to emissions from complaint carpets showed severe health problems and in some cases the mice died from exposure to carpet fumes.[46] Symptoms of irritation due to carpet emissions include eye, nose and throat irritation, headaches, skin irritation and fatigue. Some people experience shortness of breath or coughing.[47]

A recent report titled, *Allergic Diseases and the Indoor Environment*, says carpets are actually the biggest reservoir for allergy-causing dust mite and allergens in the home, and are a prime culprit in allergic diseases. Up to 100,000 mites can live in one square meter of carpet, and their droppings build up steadily as the carpet gets older.[48]

Diesel bus emissions

School buses use diesel engines for reasons of fuel efficiency and durability. Yet, diesel engines are increasingly being recognized as a serious threat to public health.[49]

Diesel exhaust is unhealthy

Despite being lower in hydrocarbons, carbon monoxide, and carbon dioxide than gasoline engines, diesel emissions contain over 40 substances listed by the Environmental Protection Agency as Hazardous Air Pollutants. The list includes benzene, arsenic, dioxins, formaldehyde and toluene. Diesel exhaust also contains high levels of nitrogen oxides and ozone, both of which are injurious by themselves and combine with other pollutants to create ground level smog.[50]

Small Particulate Matter, or soot, lodges in the lungs

Diesel exhaust contains high levels of fine soot, known as Small Particulate Matter, or SPM. The microscopic soot is easily inhaled deep into the lungs. The worst SPM are particles less than 3.5 microns in diameter. 90% of particles emitted by diesel vehicles are less than 1 micron in diameter. These particles are not easily exhaled, and stay inside the lungs for long periods of time, corroding cells and ultimately leading to tumor growth.

Low levels of diesel exhaust pose health risks to students

EPA has found that exposure to diesel exhaust, even at low levels, is likely to pose a risk of lung cancer, as well as other respiratory risks, such as asthma, to children and adults.[51] School children are exposed every day to diesel emissions, while riding on the bus and as they get on and off the school bus. Children are additionally exposed when diesel engines are allowed to idle outside school buildings. Exhaust fumes enter the building through doors, windows, or nearby ventilation intakes.

ACTION STEP: ADOPT A SCHOOL DIESEL IDLING POLICY

To limit student exposure to diesel emissions, work to have your school adopt a diesel idling policy. Components include:

- Have buses warm up away from the school building so exhaust is not drawn into the building before morning and afternoon pick-up.
- Have buses shut off engines when arriving at the school to discharge or pick up students.
- Have delivery trucks shut off engines when making deliveries, or schedule deliveries when school is not in session.
- Keep school buses tuned up for optimum performance.

See Appendix C. Draft School Diesel Idling Policy proposed for Vermont Schools. Some Vermont schools take the extra precautions of turning off air intakes before buses arrive, and waiting for the air to clear before re-opening intakes. Other schools have buses load and unload away from the school building.

This cursory review indicates that many different health symptoms can result from exposure to contaminants in school indoor air. In the next chapters we will look at ways to prevent such exposure and prevent the associated risks to school children.

BEST COPY AVAILABLE

Chapter 5. The Precautionary Approach to School Environmental Health

Ordinarily, we assume that someone in the government – environmental regulators, public health officials – is making sure that substances in common products are safe for us to use. Unfortunately, the current system actually does little to protect us against health damage arising from environmental exposures. It is only by taking preventive action to limit such exposures that we can truly protect our children from potential harm.

Uncertainties about health effects of exposures

The nature of the scientific method, the multiple ways in which response to chemical exposures can manifest themselves and the chemically-based nature of our economy make it very difficult to definitively link particular chemical exposures and specific health symptoms in a cause and effect relationship. Corporate claims about product safety rely on uncertainties, not proof. The fact that a chemical is allowed into commerce says more about the US system of regulation than it does about evidence that specific products do no harm.

Our current system: safe until proven guilty

Our current product registration system is based on the premise that if no positive proof of obvious harm is detected, any chemical can be released to the marketplace. Only if harm is detected after the fact (as thousands of people report health impacts related to a certain substance) can a chemical be withdrawn from the marketplace, and years of legal, scientific and political wrangling can pass before the withdrawal is complete. Significantly for children, most chemicals released to the market lack any proof that they do not cause harm to developing nervous systems and brains.[52]

Widespread Exposure

We are widely exposed every day to substances that have been associated with health damage, but until significant numbers of us fall ill, we have no way to prevent such exposure. In public settings such as schools, stores, hospitals and office buildings we may well encounter significant chemical exposures that we cannot anticipate or prevent. The net effect of the current system is to run an uncontrolled experiment with the general human population serving as guinea pigs.

Reasons for concern

Because we are exposed to so many potentially hazardous substances every day, it is extremely difficult to link a single exposure to a specific health effect. The weight of evidence in multiple peer-reviewed studies linking chemical exposures to chronic health effects, however, indicates strong cause for concern about the impact of specific and cumulative exposures on public health. Rising rates of chemical sensitivity, learning and behavioral difficulties, reproductive problems and cancer are consistent with the kinds of problems such studies would predict.

Dangerous loopholes

Contrary to common assumptions, there is little reason to believe that children are adequately protected by the current regulatory system.

- Less than 1% of the more than 80,000 synthetic chemicals in commercial use today have been adequately tested for human toxicity. And only a small percent of those chemicals have ever been tested for developmental neurotoxicity, or other impacts on developing bodies.
- Testing and regulation of toxicity is based on healthy adult males, not on children, females or other individuals who might

be more sensitive to specific exposures.
- Typically in the US, products linked to health impacts are only adequately tested, and removed from the market after they have done significant harm.

Children are most at risk

Children take in far more environmental contaminants per pound of body weight than do adults. Their developing bodies are less able to excrete, detoxify, and metabolize pollutants.

Environmental contaminants can enter children's body through inhalation, ingestion or absorption through the skin.

Children breathe more air, ingest more food and liquids per body weight than adults, and their behavior (playing on floor, hand-to-mouth contact, rolling on ground, etc.) exposes them to more and different concentrations of environmental contaminants than does adult behavior.

Hazardous materials can remain in the air or settle onto desks, play areas, floors and other areas where they are readily available for absorption, inhalation or ingestion. Multitudes of hormonally governed processes regulate children's growth and development. Increasingly, evidence indicates that toxic substances work by disrupting hormonal function. Children are uniquely vulnerable to this type of interference at specific moments of development.

A precautionary approach

Given scientific evidence of potential harm, and the troubling trends that seem consistent with that research, policymakers worldwide are turning to an alternative model for regulating potentially harmful substances. This approach suggests that since we can never know with 100% certainty if a particular substance is dangerous, we should look at the weight of evidence associated with that substance and take action to protect against its potential risks before it is widely used, rather than waiting to restrict its use after we find that harm has been done. We should take precautions to protect against risk wherever possible rather than waiting to deal with problems in future.

Common sense risk reduction

Though this sounds complicated, it is really the guiding principle for any number of activities we undertake in our daily lives and in our social regulation. Looking both ways before we cross the street, buckling up, wearing bike helmets, putting food in the refrigerator, keeping hazards out of the reach of children, such as by locking the medicine cabinet—all are simple preventive actions we implement in the absence of immediate danger.

Precautions to prevent harm

By removing possible sources of chemical or biological health impacts, schools can prevent health problems among students and staff rather than having to deal with them after the fact. Pro-active measures to reduce risks to children's health in schools involve reducing or eliminating harmful compounds or exposures and ensuring that conditions do not exist to foster growth of biological contaminants. Such measures are often simple and inexpensive, whereas solutions to environmentally induced illnesses can be highly complex and cost significant sums. A simple example would be the installation of walk off mats to prevent carpet damage, instead of replacing moldy carpets after students develop respiratory problems.

See also Chapter 8, Evaluating School Products for Health and Environmental Impacts for examples of preventive measures.

What does this mean for schools?

Preventing risk and harm to children is a daily goal of Vermont schools. Yet general

awareness of the risks related to poor indoor air in schools is very low. Children may encounter many hazardous substances throughout the day just taking part in their routine activities. Products used on school grounds that contain or generate potentially hazardous chemical compounds include pesticides, paints, glues, building materials, school office supplies, maintenance products and office equipment.

Because children's bodies are growing and developing, exposure can have long-term health effects as well as day-to-day effects. Yet while school administrators would never allow a very young student to use an inappropriately sharp knife, they may not understand the repercussions of that same small child using a glue or solvent related to potentially severe health impacts, or of allowing that child to be exposed to harsh cleaning chemicals, pesticide residues or mold spores from wet carpets.

Open Communication—the key to rapid resolution of school environmental health problems

School environmental health is a community affair and open communication is the key to successfully working together.

Although many school environmental health problems are unnerving and very few are actually life threatening, serious health problems for students and staff do arise. Dealing with any problem responsibly involves setting realistic goals and timetables that everyone can agree on.

Where truly hazardous situations are discovered, every effort should be made to deal with them quickly. Parents should be notified as soon as possible and school officials should seek outside assistance from the Vermont Department of Health.

Communicating early and often about risks and concerns can save everyone time and aggravation, and lead to early resolution of school environmental health problems.

Vermont schools have gone down a variety of paths to achieving better indoor air. Where communication has been poor, denial of parents concerns by school boards and administrators has been compounded by highly charged parental outrage. Anger levels stay high, and improvements can be delayed, often for years. In some cases, litigation has been the only method of resolving differences, at great monetary and emotional cost to the entire school community.

Where communication has been open, and administrators have honestly addressed issues raised by parents and staff, resolution has often been both pro-active and problem free.

For this reason, VPIRG advocates that parents make every effort to work with school administrators and school boards in a non-confrontational manner—even when concern levels are high. Conversely, addressing emotional issues brought by concerned parents requires that administrators promote open dialogue, and involve parents throughout problem solving efforts.

The most successful and lasting efforts to effect change will be those cooperatively managed and promoted by representatives of all school constituencies. Participants will acknowledge and try to accommodate the needs of all parties, including financial planning constraints experienced by administrators, while attempting to eliminate potential exposure hazards as quickly and fully as possible.

Chapter 6. Getting the School Community Involved

Act 125, Vermont's new School Environmental Health Law

Act 125 sets up a web-based information clearinghouse at the Vermont Department of Health to help schools identify and eliminate potential hazards arising from the use of cleaning materials, art, science and shop supplies, construction and furnishing materials. The bill also establishes a process to develop model policies and procedures (by summer 2001) that schools can adapt to their own circumstances to resolve and prevent school environmental health problems.

Parents' role is the key to implementing Act 125

Because the legislation created no mandate for school districts to undertake specific environmental health improvements, it will take pressure from concerned parents, staff, teachers and other members of school communities to ensure that individual schools make use of the new information based system to protect students and staff. Parental involvement is key to driving the officially recognized information dissemination process.

How to do an Environmental Health Audit of your school

Under Act 125, Vermont's new healthy schools law, all Vermont schools will eventually implement a routine yearly environmental health audit of each school building.

Don't delay! Get the ball rolling in your school

You do not have to start out as an indoor air quality expert to do an audit of your school. Getting the process started just requires common sense and a little background. Audits can be done at several levels and in ongoing stages geared to the expertise of the participants. See Tools for Schools for practical advice on conducting an audit.

Audit participants

Participants in planning and implementing the audit(s) typically include combinations of the head custodian, the school nurse, a representative of the school administration, a concerned parent, a teacher, and a student.

A checklist is essential

It is essential that you have a checklist to review and make notes on as you proceed.

Tools for Schools contains a number of useful checklists. VPIRG has used and recommends the Green Building Housekeeping and Maintenance Checklist, by Stephen Ashkin. Information is also available from the Vermont Department of Health, other states, and national and local organizations specializing in school indoor air quality and via the Internet.

Key things to look for in any school audit

- Moisture entering the school or condensing on cool surfaces, such as floors.
- Sources of dirt and dust.
- Adequate ventilation for each room. Special consideration is given to bathrooms, supply closets, science lab storage, shop material storage and work area, and rooms housing photocopiers, printers, and computers.
- Inventory of all custodial maintenance supplies, including cleaning products, disinfectants, and pesticides.

Goals of the audit

- A close look at school practices related to school environmental health
- Identify simple preventive steps to improve indoor living conditions
- Identify uncertainties, raise questions, and note follow-up needs.
- Determining priorities and implementing solutions to potential problems identified naturally follows when an active committee or group is assembled to discuss next steps.

10 Steps to forming a School Environmental Health Committee and expanding community participation

Forming an informal environmental health working group at your school will get the process started. Below is a basic guide to help such a group take steps to organize your school community to address the issue of health hazards posed by school products and practices.

1. Contact parents and staff

Talk with concerned parents and school staff members to float the idea of establishing a working group to look at environmental health hazards at your school. Numbers are important—even if people are just expressing support for the idea, count them (and their spouses) in your list of initial supporters. You can hold a living room meeting to discuss the issues with a small group and kick off your organizing effort.

2. Develop informational materials to share

Working from the Vermont Department of Health healthy schools website, VPIRG's website and EPA materials, assemble some basic facts. Simple lists such as common problems, or health effects of common cleaning products are easy for people to grasp and give a sense of the issues involved.

3. Meet with the Parent Teacher Organization

Get on the agenda of the parent teacher organization to discuss environmental health issues in school and elicit support. Few people will object to the concept of a health and safety committee dedicated to ensuring a healthier learning environment. Some may actually join in the work. If possible, have the organization endorse your effort.

4. Meet with administration and staff

Go in with several parents and one or two staff members if possible to begin an ongoing dialogue with school administrators. Ask them to support an environmental health improvement effort, and let them know how many people you have talked with who support the idea. An early buy-in by school administrators speeds environmental health improvements.

5. Conduct a school environmental health audit

With permission from the administration, arrange to conduct an audit with an administrator, a teacher, the head custodian, and at least one parent. Use a standard green building or school environmental health checklist. See Appendix B. (Contact VPIRG for information on how to conduct a school environmental health audit.) The initial audit does not have to be 100% complete. Often the audit is useful for identifying concerns in need of a more thorough follow-up.

6. Prepare preliminary recommendations

Look for the actions that are easy to implement (e.g. replace toxic dry erase markers, clean out refrigerators, install walk-off grates, etc.). Create a rough list of more substantial actions needed, based on the audit and try to rank them in terms of importance. Go over the list of recommendations with administrators.

BEST COPY AVAILABLE

7. Meet with the school board

Arrange to be part of the agenda of a regular meeting. Give board members an overview of audit results and allow for questions. If you don't know the answers, stress that an environmental health committee is the appropriate group to investigate potential problems, look for answers, and help implement solutions. Invite Board participation. Let the school board know that the Vermont Department of Health can provide assistance and advice on lowest-cost ways to approach the issue. You can mention that the Vermont School Boards Association was one of the primary supporters of the statewide Healthy Schools initiative. Report regularly to the school board to keep them involved.

8. Establish a formal working group for the implementation phase

Ideally, this will consist of a stand-alone "School Environmental Health Committee" including students, parents, teachers, the school nurse, custodial staff and administration. Some schools may delegate the responsibility to an existing committee that deals with health issues or buildings and grounds.

9. Inform and involve the community

Present your initial findings and recommendations to staff, students, PTA, and community. Information about changes in school practices and policies can be sent home with school newsletters, presented as part of regular school board meetings, as a written report in the Town Annual Report or as articles in local papers. Informing community members about environmental health concerns and progress in the school ensures informed decision making if larger projects are needed.

10. Plan for an annual follow-up presentation to the community.

Keeping the community informed of successes in an ongoing way can continue to build support for improvements. An information update will be useful to new parents, newcomers to town, and townspeople who may have been only casually interested at the outset.

How to establish a formal Working Group at your school

- Introduce EPA's *Tools for Schools*, or an equivalent program approach as a way to begin to address the issues identified through the audit.
- Plan on regular meetings (e.g. once a month) to monitor progress and involve more community members.
- Research and budgeting will be necessary if any significant changes in purchasing or other practices are involved – the committee must be highly informed about alternatives to push for change. By making use of the services of the Vermont Department of Health and VPIRG and other organizations, committee members can prepare a persuasive case for their recommendations.

Chapter 7. Basics of Indoor Air Quality and School Environmental Health

Sources of harmful chemical exposure in schools include:

Building Materials

Many building materials such as adhesives, pressed-wood products, paints and vinyl-coated wallpaper contain harmful chemical ingredients. A variety of solvents are used in roofing, painting and renovation that can cause skin dryness, respiratory irritation, and with greater exposure, dizziness or nausea. Contractors are often unfamiliar with non-toxic construction materials, and hesitate to use them unless required to, making it difficult to protect occupants from the hazards of remodeling. Carpeting alone may release over 120 different harmful chemicals. See also, Building Materials, page 47.

Office Equipment and Supplies

Photocopiers and other electrical office equipment may give off ozone, which irritates the eyes and the respiratory tract, causes headaches, and has been associated with adverse genetic effects. Ink toner in photocopying machines contains many dangerous substances including methyl alcohol, a solvent that can dry the skin, irritate the eyes, nose and throat and cause dizziness or even blindness. Many common office supplies are also hazardous, releasing vapors and dusts that can cause a variety of skin and respiratory problems. These include glue, rubber cement, inks, carbon paper, carbonless paper, typewriter ribbon, whiteboard cleaner and correction fluid.

Cleaning Products

Many commonly used custodial products contain hazardous ingredients. Custodians bear the brunt of exposure to ammonia-based cleaners, as well as disinfectants, pesticides, furniture polish, window cleaners and a variety of highly perfumed cleansers. Students and staff can also suffer when vapors from these products are trapped in indoor spaces.

Art and Science Classes

Many of the materials used in art and science classes contain chemicals with both acute and chronic health effects including alcohols, petroleum distillates, oxidizing materials, dyes, metal pigments and solvents. See Classroom Exposure – Art Supplies, page 31.

Wood, Industrial and Metal Shop Classes

Sawing, machining, casting, welding, painting and cleaning can expose students to hazardous air and contact contaminants. Though exposure levels in shop can be similar to levels found in industrial settings, there are no uniform air quality or protective equipment guidelines for these activities in schools. See Classroom Exposures, Industrial Arts Classes, page 32.

Pesticides

A number of Vermont schools still apply pesticides in and around buildings and on playing fields. Pesticide droplets and fine particles become airborne then settle on walkways, grass, carpets, desks, tables and toys. Once tracked indoors, residues may remain biologically active for several days, weeks or longer. Pesticide use performed by the calendar rather than in response to actual pests subjects every building occupant to unnecessary pesticide exposures. Even where chemical pesticides are used only in response to a pest problem, other much safer methods could better protect building occupants from undue risks. See Pesticides, page 40.

Biological Air Pollutants

All school buildings, as well as other workplaces and offices have unavoidable levels of biological pollutants. Exposure to mold, pollen and viruses is the inevitable consequence of bringing people together. Some level of biological contamination is unavoidable. Keeping the effects of such contamination to a minimum is the goal of managing biological pollutants inside a school.

Mold grows anywhere nutrients and moisture are present

Mold is a type of fungus. Local moisture from leaks, floods and perpetually damp carpet near outside doors creates conditions conducive to the production of fungal growth, referred to as mold. Mold, or mildew is a mass of vegetative filaments and fruiting structures produced by various fungi. The seeds of mold are called spores. Both mold and mildew fungi use plant or animal matter as sources of food for growth and reproduction and both require a relatively high level of humidity to thrive.[53]

Common sources of mold contamination in schools[54]

- Shower areas and damp gym clothing
- Water or snow from boots, or wet clothing
- Storage areas for damp sneakers, boots
- Leaky fountains, sinks, toilets
- Books and papers stored in damp areas
- Certain carpets, ceilings, walls (due to moisture from excess humidity)
- Roof, basement, plumbing, or pipe leaks
- Unclean refrigerator drain pans
- Metal window frames
- Over-watered plants
- Buildings located in poorly drained areas

Air intakes can be a source of mold

If air intakes are near standing water on roofs or around buildings, ventilation systems can be sources of mold. Bird droppings or other organic debris can get into systems. System components, such as humidifiers, cooling coils or condensation drip pans, if not regularly cleaned, may be a source of fungal growth. While HVAC systems are often treated with biocides to prevent mold contamination, this practice may pose an additional health risk to students if not properly managed. The safest way to prevent contamination is to keep moisture out of the system with proper construction and maintenance.

Improving ventilation and lowering humidity is the solution to reducing mold levels

Adequate volume of circulating air, especially air from outside the building, is the best preventative for mold and mildew. Stopping drips, mopping up water spills, removing water damaged tiles and carpets are essential to controlling mold growth.

Remove continuously wet carpets

When molds become established, it is very difficult to get them out. Wet carpets have square miles of surface area substrate for mold growth. EPA recommends removing carpets if they remain wet for more than 24 hours.[55]
See also Health Implications of School Indoor Air, Biological Pollutants, page 17.

Dust and Fine Particles

Pollutants of many sorts settle onto outdoor soil, and may become part of dust brought indoors. Once indoors, pesticides and other solvents attached to dust do not break down readily because they are protected from sunlight and soil microbial action. Lead, pesticides, road dust, mold, dust mites and other dust allergens and pollutants accumulate in nearly all floor cracks, rugs and carpets.

What is dust?

Dust is a highly variable mixture of many kinds of waste materials. Depending on building activities, furniture, carpets, building materials, and composition of tracked-in dirt, a speck of dust may contain fabric fibers, human skin particles, microscopic mites, bacteria, viruses, mold spores, food particles, heavy metals and pesticides.

Most common dust pollutants

Pesticides

Any use of herbicides and pesticides around a building exterior can result in dust with pesticide residues being tracked into the building. Pentachlorophenol (PCP) wood preservatives outside the building result in high levels of PCP dust concentrations inside for years after application.[56]

Lead

Because lead does not degrade, over time lead accumulates in soil. Around old buildings, lead levels may be high from past paint leaching, and flaking and scraping of old lead paint. Lead adhering to soil dust particles can be tracked into the building. Lead in carpet dust is nearly proportional to the level of lead found in the soil around a building foundation.[57]

Road dust

Road dust contains varying levels of toxic pollutants, including pesticides from roadside spraying, arsenic, asbestos, cadmium, chromium, lead, nickel, tars, PCBs, and PAH compounds.[58] Used motor oil is found in road dust, and contains lead, cadmium, PAHs, PCBs, chlorine and dioxins.[59] Dirt-laden snow under automobile fenders dropping onto parking lots has high dust levels and contributes to hazardous track-in from parking lots.

Dust mites, mold and other dust allergens

Presence of dust and moisture (over 60%) in carpets provides ideal habitat for dust mites, molds, bacteria, and fungi to grow.

Rock salt tracked into buildings may be irritating

Salt dissolved in water becomes incorporated with building dust as the water evaporates. This dust can be irritating to sensitive individuals. Sand is more likely to be caught on walk-off mats than salt. In general, use minimal rock salt to cut ice during the winter.

Housekeeping tips

Dust—keeping it out

Inside dirt and dust begins as outside dirt and dust

Dirt tracked into the building from unpaved parking areas and muddy walkways by entry doors contributes a significant daily load of dust to the building.

Step One—keep dirt from penetrating the building

Keeping dust out of the building is the most effective strategy for reducing indoor dust levels. Preventing dust from entering a building is far easier than removing attached lead, pesticides, and polycyclic aromatic hydrocarbons (PAHs) once they are in the building. Control of dust is recognized as an affordable and effective way to reduce total pollutant exposure to building occupants.[60] Improved housekeeping strategies and practices can greatly reduce the amount of dust and fine particulate matter inside a school building, as well as increase custodial efficiency.

Identify areas of exposed dirt adjacent to school entrances where students may be picking up dirt on their shoes. These areas should be fenced off or screened with shrubbery. If students cross a dirt parking lot, a knock off grate should be installed just

outside the door.

Keep walks and parking areas clean and shoveled so shoes stay clean and dry.

Step two—trap dirt at the building perimeter

The second step is to trap dirt near the perimeter of a building allowing custodians to focus efforts near school entrances, rather than chasing dirt throughout the building.

Low cost techniques for trapping dirt at the building perimeter:

- Install a walk-off grate in front of each entranceway. Grates provide a visible reminder for people to knock dirt off their boots prior to entering the building.
- The grate serves the added function of reducing moisture buildup on the interior walk off mats during the winter by cutting the amount of snow tracked into the building.
- Entryway matting systems with recessed soil traps can be installed just inside each door. Clean the recess frequently.
- Increase the use and size of walk-off mats at all entrances. This provides a barrier to keep soils and particulate matter confined to the edge of the building. At a minimum, mats should be sized to catch four footfalls. Longer is better.

Vacuum the interior walk-off mats several times during the day.

Wherever the entranceway also serves as part of a main corridor for movement between parts of a building, such as two wings or two stories, dirt trapped on the walk-off mats and on stair treads can be continuously tracked further into the building interior during the day. Providing staff with a lightweight backpack vacuum cleaner or equivalent allows relatively easy cleaning following student arrival and again during the day as needed.

Triple walled vacuum cleaner bags work best. Fit vacuum cleaners with triple walled paper bags (as opposed to single walled bags). This significantly reduces the amount of fine particulates escaping from the vacuums. For optimum efficiency, bags should be discarded when half-filled.

Remove carpets whenever possible

In addition to being ongoing sources of biological contamination, carpets trap, hold and release dust. Whenever carpets are removed, replace with an impervious floor that can be mopped.

Paving the parking lot keeps the building cleaner

Parking lot paving reduces track-in of dirt and contributes to custodial efficiency. Price considerations of paving should take this factor into account. Wherever parking lots are unpaved the gradient in front of the building should be examined and adjusted as needed to reduce water accumulation in front of the building.

Lead

The heavy metal lead is long recognized as a source of learning and developmental disorders that may persist into adulthood.[61] Toxic effects of lead result from very low levels of exposure.[62]

The legacy of lead paint

Old paint is widely acknowledged as a source of lead. Before 1978, many Vermont buildings, including schools, were painted with lead paint. No one uses it anymore, but the lead in the old paint doesn't go away. High levels of lead in the skirt around the school result from paint weathering and lead washdown. Because lead does not decompose, it incorporates into the dust and dirt tracked into the school building. Where students trek over carpets, lead accumulates in deep carpet dust, serving as a source of continuous exposure.

Vermont children have elevated lead levels in their blood

According to the Vermont Department of Health, at least 9 percent of Vermont 2-year-olds overall, and at least 14 percent of the children on Medicaid, may have had elevated levels of lead in their blood. Recognizing that children are exposed to many sources of lead, the Health Department has increased awareness about how to prevent childhood lead poisoning and increased the number of children tested.

Vermont's Lead Poisoning Prevention Act

The Vermont legislature responded to this health threat by enacting a law to help prevent children from becoming lead poisoned in older rental housing and day care.[63] In addition, because of the health risk from improper renovation or removal of lead paint, all lead abatement contractors and workers must be trained and licensed.

Rules for lead abatement are clearly spelled out

Owners of rental property and childcare facilities built before 1978 are required to take steps to reduce hazards and protect children from lead poisoning, including:

- Inspecting the condition of interior and exterior paint on their properties and performing essential maintenance.
- Signing an affidavit stating that essential maintenance practices have been carried out and filing it with their insurance carrier and the VT Department of Health.
- Providing occupants with a pamphlet about lead poisoning prevention.
- Posting a notice asking people to report chipping or damaged paint.
- Making sure that anyone who performs essential maintenance work on the property does the work correctly and has completed a lead abatement training program or is supervised on-site by someone who has completed the training program.

Information on lead monitoring and hazard abatement

For general information from the VT Dept. of Health about applicable state and federal laws, educational materials about lead poisoning, or a list of state-approved classes, see http://www.state.vt.us/health/lead.htm or call 1-800-439-8550 or 802-865-7786.

For educational presentations about childhood lead poisoning prevention or HEPA vacuum rentals: VT Lead Safety Project, tel. 802-453-5617

For support and information for rental property owners: Apartment Owners, Inc., tel. 888-LOW-RENT

For support and information for tenants: Vermont Tenants, Inc., 802-864-0099

For general information for child care facility owners: VT Dept. of Social & Rehabilitation Services, 802-241-2158.

Radon

Radon is a colorless, odorless, tasteless gas, which results from the radioactive decay of radium. Radon in turn breaks down into radon decay products called short-lived radionuclides. These decay products either as gases or attached to airborne particulates, are inhaled. In the lungs, further radioactive decay occurs, and this process can initiate the process of carcinogenesis.

Natural radioactive decay products cause cancer

Each radioactive element decays at a very specific rate. The rate of decay is measured in terms of the element "half-life", or the amount of time for one half of a given amount of the element to decay. Uranium has a half-life of 4.4 billion years, so a 4.4-billion-year-old rock has only half of the

BEST COPY AVAILABLE

uranium with which it started. The half-life of radon is 3.8 days. In a jar filled with radon, only half of the radon would be left in 3.8 days. But the newly made daughter products of radon would also be in the jar, including polonium, bismuth, and lead. Polonium is also radioactive - it is this element, which is produced by radon in the air and in people's lungs that can hurt lung tissue and cause lung cancer.[64]

Radon enhances other carcinogens

Radon is estimated to cause many thousands of deaths each year. Radon is the second leading cause of lung cancer in the United States today. Only smoking causes more lung cancer deaths. Tobacco smoke in particular acts synergistically with radon,[65] as do other airborne pollutants.

Schools are a significant source of radon exposure

For school children and school staff, school is likely to be the major exposure to radon. A nationwide radon survey found over 19% of schools had occurrences of radon at levels above which EPA recommends corrective action. EPA recommends frequent testing of all rooms in contact with the ground.[66] Mitigating radon problems can be costly, but mitigation efforts will have the end result advantage of improving ventilation and air quality in the school.

See also the Vermont Department of Health Fact Sheet on **Radon**, available at http://www.state.vt.us/health/_hp/radon/radon.htm#what

Classroom exposures – Art Supplies

Hazardous art supplies are common in Vermont schools

Art supplies emitting and containing hazardous chemicals and heavy metals are still found on school shelves and in the hands of school children. Art supplies that can cause health problems when used by children include rubber cement, permanent felt tip markers, pottery glazes, enamels, spray fixatives, wheat wallpaper paste and many others.

Health effects of school art supplies

Some chemicals in art supplies such as epoxy glues and xylene in markers may trigger allergic sensitization in children and lead to a lifetime of allergic reactions. Solvents can trigger asthma and affect concentration and performance. Heavy metals may bio-accumulate and affect future learning potential.

Criteria for selecting safe art supplies:

- ☐ No dust or powders that may generate an inhalation hazard. Examples include clay in dry form, powdered paints, glazes, pigments, and wheat paste.
- ☐ No chemical solvents or solvent containing powders. Examples include rubber cement and its thinners, turpentine and other paint thinners, and solvent-based markers and marker cleaning solutions.
- ☐ No cold water dyes or commercial dyes.
- ☐ No aerosol spray cans or airbrushes.
- ☐ No acids, alkalis, bleaches or other corrosive chemicals.
- ☐ No lead, cadmium or other metals. These can be found in paints, glazes, enamel, metal work, and or stained glass supplies.
- ☐ No donated or found materials, unless ingredients are known.
- ☐ No old materials purchased before 1990.

Comprehensive list of art supplies for children to avoid (from State of California)

The California Office of Environmental Health Hazard Assessment maintains a

ABOUT THOSE FELT TIP MARKERS

With the gradual replacement of chalkboards with whiteboards, many teachers and students have complained about feeling ill or suffering respiratory effects when in a room where dry erase markers are used. These markers may contain a number of solvents, including xylene, a known hazard. When children use these dry erase markers, solvents are released right into the child's breathing space. The closer the child is to the marker and whiteboard, the greater the inhalation danger.

Xylene is harmful at low doses

Like its close chemical relatives, benzene and toluene, there is now considerable evidence that xylene has toxic effects at extremely low levels. Xylene exerts it greatest effect on the developing fetus, particularly in the earliest stages of fetal development. This makes the most at-risk population in schools from low dose xylene exposure the unborn children of staff or students who may be pregnant, and may not even yet know it.

Exposures have a cumulative effect

Xylene, like many organic solvents, is fat-soluble. This means xylene builds up in human body fat. Repeated exposures add up, and are added to children's daily exposure to other harmful vapors, emissions, pesticides and dust. All of these exposures work together to exert subtle cumulative health and behavioral effects on children.

"Non-toxic" substitutes often contain unknown ingredients

Felt tip markers are not environmentally friendly products, and may contain a wide array of ingredients, including harmful solvents. Water-soluble markers may release fewer volatile chemical compounds, but without labeling requirements, chemical ingredients may be highly variable and unknown. In general, reducing use of markers is recommended in a school setting.

At a minimum, use only markers you know to be xylene free.

comprehensive list of art and craft materials banned for purchase or use in Kindergarten and grades one through six in California. Contains useful guidelines. Download from the Internet: http://www.oehha.org/education/art/getart.html

Classroom exposures—Industrial art classes

Industrial art classrooms hold potential for student exposure to a variety of unhealthy compounds, ranging from sawdust to solvents. High school shops typically conduct a range of activities such as woodworking, gluing, painting and staining, small engine repair, and welding.

Adequate ventilation, choice of products, and use of safety gear are the principal means of reducing exposure in shop class.

Ventilation

The first rule for shop classrooms is that they must be well ventilated. Active air draw of 15 cfm per student as recommended by ASHRAE for enclosed spaces should be the minimum airflow. Inspect and change filters regularly. Use of individual hoods vented to the outside is recommended for any activities involving solvents and other VOCs.

Sawdust collection and minimization

A working sawdust collection system should be in place and properly maintained for all sawing and sanding operations.

Sawdust is a respiratory irritant, so every effort should be made to keep sawdust levels to a minimum. Sawdust needs to be swept up daily, and surfaces wiped with damp cloths. Students can do daily dusting with a wet cloth as part of cleanup.

Sawdust tracking into adjacent rooms can be minimized with use of a walk-off mat that is vacuumed between classes.

Pressure treated lumber

Pressure treated wood should never be used by high school shop programs. Sawdust from pressure treated lumber contains CCA (chromium copper arsenate) and is extremely toxic by inhalation and ingestion, and highly toxic by skin contact. It is a known human carcinogen and teratogen (birth defect inducer). Even casual skin contact can cause skin irritation and allergies, skin thickening and loss of skin pigmentation, and repeated exposure can cause ulceration, and skin cancer. Inhalation can cause respiratory irritation, and skin, lung and liver cancer. Inhalation or ingestion may cause digestive disturbances, liver damage, peripheral nervous system damage, and kidney and blood damage. Acute ingestion, although not likely in a school setting, may be fatal. If CCA lumber has ever been milled in the shop room, a thorough clean out of the room is recommended, including complete vacuuming with a HEPA-filter equipped vacuum and wet dusting of all surfaces.

Use of volatile chemicals in shop classes

Highly volatile solvents, including gasoline, paint thinner, petroleum spirits, petroleum based stains, and motor oil have been traditionally used and stored in shop classes around the state. Often these materials are stored in unvented cabinets which off-gas volatile compounds into the classroom. These highly volatile substances not only pose exposure risks; they also present a significant fire hazard.

Action Steps for Industrial Arts Classes

Clean out existing volatile chemical inventory

Completely clean out the chemical storage cabinet and dispose of any partially used solvents at a Solid Waste Management District Household Hazardous Waste Collection. Cabinets should be thoroughly cleaned to remove traces of VOCs

Restock with least toxic chemicals

Restocking supplies with low volatility water based solvents will substantially reduce harmful chemical exposure to students and staff, and help students understand that less toxic alternatives are available to them. Water based solvents have become the norm for industrial settings for health reasons and because of the difficulties in disposing of petroleum based solvents.

Basic precautions for use of any chemicals in shop classes

Providing a vented cabinet for storage of any volatile compounds is standard procedure in industry. Even with low volatility chemicals an eye wash station should be installed in the room. Installation of a large vented work surface for use of any volatile chemicals provides the maximum protection for students and staff.

Small engine repair

Dismantling and rebuilding of two-stroke engines, such as chain saw and lawnmower engines, is frequently undertaken in high school shop classes. The general recommendation is to store chainsaws, motors, etc. outside in locked vented cabinets, along with any fuels and solvents needed to maintain them. Maintenance should be performed outdoors or under a vented hood. Public health officials regard indoor use and storage of gasoline and oil as highly dangerous.

Carpets

Carpets in schools became popular in the 1970's and 80's as a way to make classrooms warmer and quieter. Air quality complaints are frequently linked to carpets, and school carpets are no exception.

Carpet systems contain toxic components

Carpet "systems" include carpet, padding and adhesive—all of which can emit toxic fumes, primarily Volatile Organic Compounds (VOCs). Most notable among these is 4-phenylcyclohexene (4-PC), a by-product of styrene-butadiene latex (SB latex), used as backing on many carpets and associated with the strong odor of newly installed carpet. Other VOCs associated with carpets include (but are not limited to) styrene, acetone, toluene, xylene and formaldehyde.

In a study of 19 types of carpet, all were found to off-gas styrene and 4-PC. In all, 69 chemical compounds were identified as off gassing from the various carpet types.[67]

In addition to the fibers, padding and adhesive, carpet off gassing is related to carpet fiber dyes, topical treatments such as anti-static and fire retarding agents, fungicides and pesticides.[68] A widely used carpet stain repellent called Scotchguard® (perfluorooctane sulfanate) has recently been found widely in the human bloodstream.

Though no known health effects are associated with this persistent and pervasive chemical, its use is being phased out as a precautionary measure due to concerns that it may interfere with normal human body chemistry.

The large surface area of carpets compounds indoor pollutant exposure

Compared to smooth linoleum floors, carpet fibers provide vast surface areas for thriving growth of bacteria, mites and fungi. Mold and mildew flourish in an environment kept moist by basement condensation and snow and water brought in on shoes during winter months. The large surface area of the carpet fibers and of the dust particles themselves increases the deposition, storage, and release of gases and fine particles.[69]

Carpets are a catch-all for contaminants

Besides the emission of chemical fumes, carpets act as a catch-all for contaminants in the classroom. Food particles are ground into carpets, providing nourishment for microbes and small insects. Tracked-in dust also builds up in carpets. Studies suggest up to two thirds of dust in buildings is tracked in on occupants' feet.[70]

Common contaminants deposited by shoes onto carpets include:

- Oil and salt laden dust from parking lots
- Pesticides from roadsides and school grounds
- Lead from old paint dust in the soil around the building
- Solvents from cleaning agents used in other areas of the school.

Carpet removal is the best long term solution

Carpet cleaning efficiency is highly

variable and seldom removes deep dust. In addition, carpet-cleaning products can contain irritants and heavy perfume agents that can cause reactions in sensitive individuals.

Carpets continue to accumulate and release contaminants throughout their life. Replacement of fitted carpets with low surface area flooring, such as linoleum, is already being done by a number of Vermont schools and should be considered in long-term maintenance and replacement plans for all carpeted areas.

In new construction—bypass carpets in favor of impervious flooring

Hard impervious floors that can be mopped are a better long-term investment for the school community, in terms of durability, cleaning efficiencies, and health implications. Chlorine-free polymer floors are coming onto the market, allowing an alternative to vinyl linoleum.[71]

Paints

Freshly painted surfaces can release large volumes of VOCs for weeks after application. Fortunately, interior and exterior paints with low VOCs are now offered by major paint suppliers. For small interior applications with limited ventilation or where any VOC release is a concern, higher priced environmentally friendly paints can be used. See Information Resources for examples of commercially available paints.

Use of oil-based paints should be avoided in the school setting. In addition to long outgassing times, the cleanup of oil-based paints involves harmful solvents or thinners, which may pose health risks to applicators.

Timing of paint applications should aim to minimize student and staff exposure to paint fumes. Summer vacation is optimal because the building can be completely ventilated during the painting operation. Because most off gassing occurs within the first week after application, a lag time of one to two weeks before occupancy should be planned for.

Vermont School Lab Chemical and Mercury Clean-out Project

Vermont schools are beginning to clean out mercury and unused science lab chemicals under a new program administered by the Vermont Agency of Natural Resources. To date more than 50 schools have participated in this project.

Of the twenty-five (25) schools that have completed chemical inventories and disposals, approximately 250 pounds of mercury, 4000 pounds of hazardous chemicals and 2000 pounds of non-hazardous chemicals have been collected for proper disposal.

http://www.anr.state.vt.us/dec/ead/mercury/SchoolCleanout/coupdates.htm

BEST COPY AVAILABLE

Chapter 8. Evaluating Products for Health and Environmental Impacts

A wide variety of chemical office and cleaning supplies are used every day in Vermont schools. From photocopier toner (fine dust) to bathroom disinfectants (fungicides and bleach) to carpet cleaners (fragrances), school children breathe in a variety of vapors and particles every day.

Whenever hazardous or potentially hazardous materials are used in a school setting, its important that custodians be aware of the risks and how to avoid them to minimize student and staff exposure. Similarly, teachers should understand all labeled products used in classrooms. When employees know what materials are being used, how to use them safely, and what to do if an emergency occurs, the school as a workplace can be kept much safer.

Ultimately, every product used in a school should be scrutinized and least toxic alternatives phased in. A first step is evaluating product safety using the label and Material Data Safety Sheets (MSDS).

Product Label

Container labels contain basic information on ingredients and how to use the product safely. Information is often incomplete. Some manufacturers offer paper copies of their labels that are easier to read. The toxicity information on the label generally applies to adult males, not vulnerable populations, such as children or pregnant women.

Signal words on the label and what they mean:

DANGER – Any product that is highly toxic orally, dermally (through skin contact), through inhalation, or causes severe eye or skin burning. Products, which are deadly in small quantities with a DANGER rating, may also carry skull and crossbones with the word **POISON**.

WARNING – Any product that is moderately toxic orally, dermally, or through inhalation, or causes moderate eye and skin irritation. Ingestion of these products can be fatal.

CAUTION – Any product that is lightly toxic to relatively non-toxic orally, dermally, or through inhalation, or causes slight eye and skin irritation. These products may be fatal if ingested in larger quantity.

- **Irritating** – Causing discomfort by burning, stinging, tickling, making the eyes water, etc.
- **Reactive** – Will readily combine with other chemicals, often producing a new hazardous chemical.
- **Flammable/Combustible** – May ignite in the presence of a spark or open flame.
- **Corrosive** – Containing a strong acid or strong base causing severe burns to the skin, mouth, stomach, etc.
- **Toxic** – Exerting a harmful physiological effect to plants and animals. Materials labeled DANGER, WARNING, or CAUTION are toxic.

Read the ingredients

Because some ingredients have complex chemical names, common names are sometimes substituted. Not sure what the compound is? Check the Internet for the Material Safety Data Sheet (MSDS).

Brand Names

Each manufacturer has a brand name for its product. Different manufacturers may use different brand names for the same active ingredients. Because brand names may give little clue about the ingredients, products should never be selected on the basis of brand name alone.

MSDS – Material Safety Data Sheet

Material Safety Data Sheets (MSDS) are on file for all custodial products used by the school over the past two years. Federal law requires MSDS be maintained on site and be available for review. Ask the school to make it a standard practice to request MSDS be included in all purchases.

MSDS provide a wealth of information

A Material Safety Data Sheet is designed to provide both workers and emergency personnel with the proper procedures for handling or working with that substance. MSDS will include information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill/leak procedures. These are of particular use if a spill or other accident occurs.

Manufacturer MSDS generally tell only what is required

Be wary of what you read. Although OSHA specifies what information must appear, not all MSDS are complete nor are they necessarily accurate. The information is designed for use by custodians, not children. In addition, MSDS address issues of occupational health and safety, not environmental impacts.

Customer Service

Use the manufacturer's 800 telephone number to request a current MSDS if you did not get one when you purchased the product. Do the same thing if you have any MSDS that is over two years old or if you cannot find what you need to know on the MSDS. For example, ask if the product you are using contains any alkyl phenol ethoxylate, a surfactant chemical that may damage human and animal hormone systems.[72] If the service desk cannot answer your questions, then ask to talk to a chemist in the manufacturer's research or production departments.

State standards for MSDS vary

The State of New Jersey has the strongest requirements for information reporting on MSDS. Therefore, when you call, ask for product MSDS prepared for New Jersey.

Ingredient Data

Some suppliers have very limited chemical information, particularly when their products are formulated and labeled in their behalf by another firm. If the supplier cannot answer your questions about product safety or environmental impacts, then consider researching the ingredients yourself, or choosing an alternate product.

Many MSDS are available on the web.

http://www.ilpi.com/msds/#Internet lists 85 Internet MSDS search sites.

http://www.msdssearch.com/ is a site used by suppliers.

http://www.westp2net.org/Janitorial/tools/chemicaldata.htm Information from Janitorial Products Pollution Prevention Project

For more information:

Guidelines for Green Housekeeping and Maintenance, Stephen P. Ashkin, from the City of Austin, Texas, Sustainable Building Guidelines, Vol. III, February, 1998.

Healthier Cleaning and Maintenance: Practices and Products for Schools, Healthy Schools Network, Inc. 96 South Swain St. Albany, NY 12210 (518) 462-0632 e-mail: healthyschools@compuserve.com, website: www.hsnet.org.

Custodial supplies to avoid

Aerosol Cans

Aerosol spray cans are devices that diffuse air-born chemicals into the breathing space. Along with other chemical diffusers such as anti-pest strips, ozone generators, and plug-in air fresheners, aerosol sprays may be harmful to humans.

After use, no aerosol container can be considered truly empty of product and propellant. Recycling such partially filled aerosol cans is expensive and requires specially handling by hazardous waste technicians. Use of refillable pump bottles avoids problems of volatilization and container disposal.

Although most aerosols are now CFC free, butane and propane have been substituted as carriers and propellants. Both are highly flammable, creating storage hazards.

Air Fresheners

There are no studies demonstrating actual improvements to air quality from use of air fresheners, and studies on adverse health effects of air fresheners are few. Many newer versions of air fresheners act in part by incapacitating olfactory nerves rather than removing or masking offensive odors.

One study of air freshener effects found acute respiratory effects and neurotoxicity in mice. Toxicity data, chemical data, and MSDS information suggest human exposure likely results in a wide range of respiratory and central nervous system impacts.[73]

Ammonia

Ammonia (NH_3) is a colorless, pungent gas, which is often held in solution in cleaning products. It is the simplest stable compound for hydrogen and nitrogen and is the starting point for many nitrogen compounds. Ammonia reacts when dissolved in water to form ammonium hydroxide that may burn eyes and skin and pose serious inhalation risks. Cleaning products containing chlorine and ammonia should never be mixed, as the combination emits fumes that can be deadly if inhaled.

Scented cleaning products

Fragrances used in scented cleaning products contain a wide array of volatile organic compounds and solvents.[74] Sensitized people may react strongly to the presence of fragrances.

The EPA's Total Exposure Assessment Methodology found fragrance concentrations to be up to ten times more concentrated in indoor than outdoor air.[75]

Environmentally Preferable Cleaners Available to Vermont Schools

The Association of Vermont Recyclers (AVR) is helping schools switch to cleaning products that are healthier for students, staff and custodians. AVR is disseminating information about Vermont State government contracts awarded to vendors of Environmentally Preferable (EP) Cleaners. Three vendors have been selected. Schools are eligible to purchase these EP cleaners under state contracts.

For information call AVR at 802-229-1833 or e-mail recycle@sover.net or check www.vtrecyclers.org.

Chlorine bleach

Chlorine bleach is an aggressive disinfectant appropriate for situations where immediate and complete sterilization of an area is required. These are mostly emergency situations such as major blood spills, where the danger of infection may be immediate and grave. This level of disinfection is not required for the day-to-day sanitization of the school environment.

While bleach is a powerful and inexpensive sanitizer, it is a poor cleaner and a highly dangerous product that has no place in schools.

Exposure to bleach can give rise to serious health effects, particularly in children. Health effects include:

- Respiratory irritant that aggravates asthma among other conditions
- Burns eyes and skin
- Produces deadly fumes when mixed with other common cleaning products, such as ammonia or phosphoric acid cleanser.

In a school setting, cleaning and sanitizing must often take place while the children are present. No one would recommend that school cafeterias be cleaned only at the close of the school day. Yet given bleach's potential for injury to students, it is inadvisable to use it when they are present.

To use bleach effectively as a disinfectant, it must be applied to a surface and remain wet for up to 10 minutes. This creates a significant exposure opportunity to negatively impact child and adult health.

In addition to its health effects, bleach also damages carpets, fabrics and other materials commonly found in schools.

Replace bleach with a concentrated, pH neutral, EPA registered quaternary-based disinfectant or a hydrogen peroxide based sanitizer.

Case Study—The City of Santa Monica, CA

The City of Santa Monica, CA has developed specifications for janitorial products used by city contractors (including schools). Among their specifications:

"No cleaners shall contain disinfectants. Because proper/adequate disinfection of a surface requires that the surface be cleaned prior to disinfecting, the City wishes to separate out the cleaning and disinfecting processes. Eliminating disinfectants from all-purpose, bathroom and floor cleaners will reduce the toxicity of these products and will reduce the amount of disinfectant chemicals used in City operations."

Chapter 9. Pesticides

Pesticides are closely linked to acute and chronic illness and are not appropriate for the school setting. The best policy a school can adopt is to phase out the use of all synthetic pesticides and control pests by preventive management strategies. Over the years, thousands of American children and staff have reported illness from pesticide exposures at school. Common symptoms of exposure include headaches, dizziness, respiratory distress, nausea, sore throats, and rashes and skin irritation. School pesticide exposures have also been linked to serious and life-threatening conditions including near-fatal acute poisoning, anaphylactic reactions, asthma attacks, and abnormal heart rhythms. Children and school staff have been made ill from pesticides even when they were applied legally and according to label directions. Because of their strong potential to cause short and long-term health effects, pesticides are a major area in which schools should take a precautionary approach.

Many Vermont schools use pesticides regularly

A survey by VPIRG in 1998 found 75 percent of responding schools used pesticides monthly, most often on a preventive rather than treatment basis. Such preventive treatment douses school grounds and buildings with toxic chemicals without confirming pest problems first. Of Vermont schools that use pesticides, most do so without written policies, and frequently without notification. These findings suggest that school officials and staff are not cognizant of the potential health effects on children.

Many routes of pesticide exposure for children

Children can be exposed to pesticides in many ways, including by breathing vapors or dusts, absorbing residues through their skin, or ingesting residues by hand to mouth contact. Many children are exposed to pesticides at home as well as at school, leading to the potential for significant cumulative exposure. And many pesticides are persistent compounds that are not readily excreted from the human body. They slowly concentrate in a child's body fat and can interfere with growth and development.

Pesticide health hazards

Epidemiology has indicated striking correlations between home and garden pesticide use and childhood leukemia. Some studies indicate a link between certain indoor pesticides and brain cancer in children.[76] Dursban has been strongly associated with the onset of chemical sensitivity in thousands of people around the world. Recent animal experiments with very low levels of commonly used herbicides and nitrates indicate that combinations of these substances can induce learning and behavior problems at extremely low rates of exposure.[77]

Commonly used herbicides such as Roundup© can trigger severe health reactions in sensitive individuals. And pesticides are allowed into commerce based on testing of their active ingredient alone, even though close to 90% of pesticide products can consist of other ingredients. These so-called "inerts" include solvents, emulsifiers and surfactants, many of which are regulated as toxic contaminants under workplace exposure laws but not regulated when included in pesticide formulas.

Persistence increases childhood exposure

Pesticides and their toxic breakdown products can last for months, both indoors and out. Pesticide and solvent vapors can haunt indoor air for weeks or even years. Pesticide residues can contaminate indoor surfaces, and can remain in carpets and dust

for months or years, slowly re-entering the child's space. Pesticides can also persist outdoors in soil for weeks or years. Pesticides in some weed-killers commonly used at schools can last from 1 to 5 years in the soil.

The answer—phase out pesticides

Pesticide dangers are documented and known. Taking a preventive approach to the health issues raised by pesticide use requires phasing out pesticide use in schools. Preventing harm to children by actively seeking cleaner, child-health friendly schools is a community obligation. Though notification programs and restricting pesticide use to off hours are helpful in reducing risk, pesticides will always have the potential to harm children's health. Many pesticide alternatives are available and cost effective to implement. Phasing out pesticide use prevents future exposures and does not rely on partial information and weak regulation to ensure safety. Children and parents expect and deserve an environmentally safe learning space, and a no-pesticide policy is the only way to ensure that is what they get.

Alternatives to Pesticides For Schools and Public Building

Use an integrated approach to reduce and eliminate pesticides

Reducing dependence on pesticides requires an integrated approach using a variety of physical, biological, and cultural strategies and methods to manage, rather than eradicate pests.

NERVE POISONS ARE CLEARLY BAD FOR YOUNG MINDS

Organophosphate and synthetic pyrethroid pesticides are widely used nerve poisons related to poison gas developed for warfare. Exposure to nerve poisons at certain critical stages of development can permanently affect brain development and function. These widely used chemicals are strongly associated with behavioral changes, and can impair learning ability, motor and mental development, memory, emotion, and even sight and hearing.

Dursban™ (chlorpyrifos) and diazinon—gradual phase-outs in the face of evidence of immediate and long lasting harm.

Chlorpyrifos and diazinon are two of approximately 40 widely used organophosphate insecticides, known neurotoxic chemicals that together can cause cumulative health effects on developing nervous systems. An agreement with manufacturers allowing the slow phase out of school and homeowner uses puts the public at prolonged risk of exposure. Diazinon can be legally sold for use in schools until 2004.

EPA's own studies clearly recognize the dangers posed to children, often putting risks associated with continued use at many times the acceptable margin of exposure.[78] Manufacturers hail the slow phase out as a victory that allows them to use up existing stocks.

In the absence of a recall by the EPA of Dursban and diazinon, schools should immediately discontinue use of all organophosphate insecticides, and implement least toxic integrated pest management.

BEST COPY AVAILABLE

Typical Vermont school pests include: Mice, rats, cockroaches, ants, flies, moths, wasps, hornets, yellow jackets, spiders, mold and microorganisms, termites, carpenter ants, powder post beetles, etc. Most common Vermont pests can be readily managed without chemicals.

The information provided below is only a brief overview of pest control alternatives for schools. A wide variety of information sources, including some written specifically for use by those involved in day-to-day school maintenance, are now available to school personnel for implementing alternatives to pesticide use in schools. See Resources, page 53.

The following general information is patterned on U.S. Environmental Protection Agency recommendations.

Benefits of reducing pesticides

Reducing and eliminating the use of pesticides provides a number of benefits for schools:

- Cost-effective methods of pest control.
- A variety of pest management options.
- The ability to use deliberate control actions, rather than reactive actions.
- Reduction in risks to school inhabitants by avoiding the use of chemicals.

The downside of pesticide spraying

- Pesticide spraying tends to be reactive.
- Pesticide use does not address the cause of pest infestations.
- Pesticide resistance leads to cycles of application.
- Costs of future risk and liability from pesticide applications is a looming issue.
- Regulatory and reporting procedures can be complex and time consuming.

Control pests without pesticides by:

- Understanding the needs of pests: Pests seek habitats providing air, moisture, food, and shelter;
- Creating an inhospitable environment;
- Removing some of the basic elements required by pests;
- Blocking entry to buildings.

Pest management strategies:

- Perform regular site inspections to monitor pest populations before they reach threshold population levels.
- Identify pests and specific habitat requirements.
- Pinpoint source of activity
- Modify habitat by redesigning and repairing structures.
- Improve sanitation – prevention and reduction of pest infestations in schools depends on students and staff cleaning up foods, leftovers, food in lockers, gum under desks, etc.
- Evaluate results. If pesticides must be used, choose the least hazardous.

Applying preventive measures to prevent indoor pest problems

Entryways

(Doorways, overhead doors, windows, holes in exterior walls, openings around pipes, electrical fixtures, and ducts.)

- Keep doors shut when not in use.
- Place weather stripping on doors.
- Caulk and seal openings in walls.
- Install or repair screens.
- Install air curtains.
- Keep vegetation, shrubs, and wood mulch at least one foot away from structures.

Classrooms and offices

(Classrooms, laboratories, administrative offices, gymnasiums, and hallways)

- Allow food and beverages only in designated areas.
- If indoor plants are present, keep them healthy – remove diseased plants; remove infestations manually; do not over water.
- Keep areas as dry as possible by removing standing water and water damaged or

wet materials.

- ☐ In science labs, store animal foods in tightly sealed containers and regularly clean cages. In all areas remove dust and debris promptly.
- ☐ Routinely clean lockers and desks.
- ☐ Frequently vacuum carpeted areas.

Food preparation and serving areas

(Dining room, main kitchen, teachers lounge, home economics kitchen, snack area, vending machines, and food storage rooms.)

- ☐ Store food and wastes in containers that are inaccessible to pests. Containers must have tight lids and be made of plastic, metal, or glass. Wastes should be removed at the end of each day.
- ☐ Place screens on vents, windows, and flood drains to prevent cockroaches and other pests from using unscreened ducts or vents as pathways.
- ☐ Create inhospitable living conditions for pests by reducing food and water. Remove food debris, sweep up all crumbs, fix dripping faucets and leaks, and dry out wet areas.
- ☐ Improve cleaning practices, including promptly cleaning food preparation equipment after use and removing grease accumulation from vents, ovens, and stoves. Use caulk or paint to seal cracks and crevices.
- ☐ Capture rodents by using mechanical or glue traps. Check daily. Place in areas inaccessible to children.

Rooms and areas with extensive plumbing

(Bathrooms, custodial rooms with sinks and drains, locker rooms, showers, dishwasher rooms, home economics classrooms, science labs, swimming pools, and greenhouses.)

- ☐ Promptly repair leaks and correct other plumbing problems to deny pests access to water.
- ☐ Routinely clean floor drains, strainers, and grates. Seal pipe chases.
- ☐ Keep areas dry. Avoid conditions that allow formation of condensation. Areas that never dry out allow mold and fungal growth. Increasing ventilation may be necessary.
- ☐ Store paper products or cardboard boxes away from moist areas and direct contact with the floor or the walls.

Maintenance areas

(Boiler room, mechanical room, janitorial-housekeeping areas, and pipe chases.)

- ☐ After use, promptly clean mops and mop buckets. Dry mop buckets and hang mops vertically on rack above floor drain.
- ☐ Allow eating in designated eating areas only.
- ☐ Clean trash cans regularly, use plastic liners in trashcans, and use secure lids.
- ☐ Keep areas as clean and dry as possible, and remove debris.

Waste disposal and recycling areas

- ☐ Empty garbage cans daily and secure dumpsters with heavy, tight fitting lids.
- ☐ Clean the outsides of dumpsters regularly.
- ☐ Store food wastes securely.
- ☐ Clean in, under and around recycling bins routinely.
- ☐ Remove recyclables frequently.

Pest control strategies

Even with the best housekeeping practices, it is possible pests will become a problem from time to time in schools. Non-chemical methods to manage pest problems are widely available and include physical traps, vacuuming up (of roaches), boric acid baits, light traps and habitat modification. The Bio-Integral Resource Center (BIRC) guide, *IPM for Schools: A How-to manual* contains many suggestions (see Information Resources, page 53).

Model Pesticide Policy for Vermont Schools

Preamble

Children are not just little adults. They breathe more air per pound of body weight than adults do and they proportionally drink more water, and eat more. They may also not recognize or be able to avoid toxic exposures. They play or sit on or near the ground and engage in hand to mouth behaviors. They also have developing organ systems that cannot excrete or detoxify poisons as adults do. Moreover, toxic exposures in childhood can lead to a lifetime of health or learning problems.

"Pesticides pose a risk for children... Some pesticides can cause cancer, central nervous system damage, or respiratory illness. Each year more than 100,000 children accidentally ingest (eat) pesticides," *(US EPA Environmental Health Threats to Children, 1996).* Exposures to pesticides have been linked to certain cancers in children, including leukemia, brain tumors, sarcomas, and lymphomas. Exposure also affects the nervous system, is linked to birth defects, and can alter the immune and endocrine systems (Mott, et al., *Our Children at Risk, The 5 Worst Threats to Their Health,* NRDC, Nov., 1997).

Pesticides are designed to kill living organisms. As such, they pose risks to human and environmental health, and special risks to children. It is the goal of _____ School District to eliminate the use of synthetic pesticides wherever possible and thus reduce exposure to children, parents, and staff.

Therefore:

Pests will be controlled to maintain the integrity of school buildings and grounds, to protect the health and safety of children and staff, and to maintain a productive learning environment. Pesticides will not be used to control pests for aesthetic reasons alone. The safety and health of children and staff will be paramount. To accomplish these goals, the _____ School District, or _____ Supervisory Union will adopt a Least Toxic Integrated Pest Management approach to pest prevention and control.

1 Least Toxic Integrated Pest Management (IPM) attempts to prevent pest problems whenever possible. IPM includes regular pest inspections, sanitation and pest proofing measures, or modification of environmental conditions leading to pest problems.
2 An IPM program will establish pest tolerance thresholds to indicate pest population levels at which control measures will be undertaken. Thresholds will not be set based on aesthetic criteria alone. Control measures will not be undertaken if pest damage or populations are below threshold levels.
3 When pests exceed tolerance thresholds, non-chemical pest control measures (e.g., sanitation, screening, physical barriers, vacuuming, mulching, irrigation, fertilization, manual weeding, insect nest removal, pest-resistant plant selection) will be used to reduce pest population below threshold levels.
4 Pesticides will be used only as a last resort, if other pest prevention and non-chemical control measures have failed to reduce pests below tolerance thresholds. Cost or staffing considerations alone will not be adequate justification for the use of chemical control agents. When a pesticide must be used, the smallest amount of the least-toxic product that will meet pest management goals will be used.
5 No routinely scheduled (e.g., seasonal, monthly or weekly) pesticide applications will be made. No pesticide fogging or space spraying will be done. Insecticides

will be used only if non-chemical means have failed to reduce pest populations below threshold levels, and only in containerized baits, or for spot treatments targeted to insect nests or problem areas where a minimal amount of material is used. Rodent baits shall not be used unless in childproof bait boxes. Bait boxes shall be inaccessible to children.

6 Ban on the Use of the Most Hazardous Pesticides—No chemicals listed by US EPA as Toxicity I or II pesticides shall be used, nor any pesticide identified as a known, probable, or suspected human carcinogen by the U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, or any pesticide that is a neurotoxin. No high volatility formulations will be used. No restricted use pesticides will be used. Any pesticides used must be registered with the VT Department of Agriculture, Food, and Markets.

7 All pesticide applications will be done by certified pesticide applicators only. Pesticides will be applied only when no building occupants are present and only in a manner consistent with section 5 of this policy.

8 Record keeping and public access to records: _____School District or _____Supervisory Union will keep records of all pest control measures, pesticides used, and amounts and locations of treatments. Pesticide use and pest control records, pesticide Material Safety Data Sheets (MSDSs), pesticide product labels, and available manufacturer information about inert ingredients will be on file in the facility. These records will be available for inspection by parents (and prospective parents) during normal school operating hours.

9 Parental and staff notification: Parents and staff will be notified one week prior to any planned use of pesticides. Neighbors immediately adjacent to school property will be given one-week advance notice of outdoor pesticide applications. 72 hours prior to applications, a written notice will be distributed to parents reminding them of indoor or landscape pesticide applications, with warnings to remain out of posted and flagged areas until signs are removed.

10 Posting: Signs will be posted on facility doors and near site of planned applications 72 hours prior to pesticide use, and at the time of application. Pre-application signs will include the name of pesticide to be used, planned time of application, and information about availability of labels, MSDS and inert ingredients at the facility office. Post-application signs will indicate the material used, the time of application, warning or cautionary statements from product label, reentry information, and contact phone number for those seeking additional information. Outdoor applications will be cordoned off and flagged. Signs and flagging will be left in place for 7 days following application or until the reentry interval has elapsed, whichever is longer.

11 Identification and notification of sensitive individuals: Each facility will maintain a registry of students, staff, or others requesting special consideration in the event of the use of pesticides. The facility will provide personal notification to these individuals two weeks prior to any planned pesticide use, and will make an effort to address their concerns and special needs relative to such pesticide applications.

Chapter 10. General Guidelines for Improving the School Environment

Ventilation basics

What works: better ventilation plus contaminant removal

Adequate ventilation alone will not ensure good air quality in schools. Therefore, schools need to take steps to reduce the level of contaminants in school buildings.

Recommendations from VT Committee on IAQ in Schools and State Buildings

In 1999, the Committee on Indoor Air Quality in Schools and State Buildings released its final report on air quality in Vermont schools. Committee recommendations included:

- Separate ventilation for restrooms and janitorial cleaning supply rooms, with a higher exhaust standard (50 cfm).
- Office equipment (such as photo-copiers) should have separate ventilation which exhausts outside the building with no re-circulation to the rest of the building.
- Special consideration for science labs, kitchens, and art rooms.
- Special consideration be given to technical education areas—such as direct venting outside the building. Use higher standards consistent with Occupational Health and Safety Administration (OSHA) standards.

Evaluation of school ventilation system by HVAC company

According to American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) 62-1989 Standard "Ventilation for Acceptable Indoor Air Quality," a ventilation evaluation by the schools Heating, Ventilation, and Air Condition (HVAC) Company should include:

Air quality monitoring for CO_2, carbon monoxide, other gases, and chemicals, and particulates such as dust, molds, pollen, and bacteria. Total VOCs and formaldehyde should be checked after new construction.[79]

Ventilation - How much air is enough?

There are currently no national standards for indoor air quality in schools articulated by any regulatory agency. The ASHRAE standard for school buildings is widely accepted by the school environmental health community.

The ASHRAE standard

For most school spaces, such as classrooms, libraries or the auditorium, ASHRAE recommends 15 cubic feet of outdoor air per minute (cfm) for each occupant. For 25 students and a teacher in a classroom, the ventilation system should be capable of delivering 390 cubic feet of outdoor air into the room every minute. Cafeterias, conference rooms, office space and playing floors should have 20 cfm per person (in contrast, smoking lounges require 60 cfm per person.)[80]

Carbon Dioxide

Carbon dioxide (CO_2) is a colorless gas present in the atmosphere. Since humans exhale carbon dioxide, overcrowded, under-ventilated rooms are a primary source of CO_2. According to ASHRAE 62-1989, CO_2 concentration is a useful indicator of general ventilation rates.

Drowsiness and inability to concentrate are initial indicators of CO_2 concentrations above 5000 ppm. Headaches, irritability, fatigue, difficulty in breathing, increase in the breathing rate and/or pulse rate, sweating, shortness of breath, and a feeling of "stuffiness" are common symptoms of breathing air with high CO_2 levels.

Besides animal and plant respiration, com-bustion devices such as kilns and furnaces produce CO_2.[81] The Vermont Subcommittee on School Buildings advised that CO_2 levels should be around 800 parts

per million and no higher than 1,000 parts per million for classrooms.[82]

Carbon monoxide

Carbon monoxide (CO) is a colorless, odorless, toxic gas. The US Occupation Safety and Health Administration (OSHA) has set a limit of 35 parts per million (ppm) for CO. The Vermont Subcommittee on School Buildings advised a level of no more than 3 parts per million of CO in classrooms.[83] The goal for CO is to maintain indoor levels equivalent to outdoor levels.

Sources of CO

Carbon monoxide is a product of incomplete combustion of carbon-based compounds. CO is found in schools as a result of improperly vented furnaces, kilns in art classrooms and auto combustion in auto shops or bus garages.

Effects of carbon monoxide exposure

Health effects of CO range from flu-like symptoms to death, dependent on length of exposure and CO concentration. High levels of CO can result in headache, drowsiness, fatigue, nausea, vomiting, weakness and dizziness. Extreme exposure to CO can result in permanent brain damage or death.[84]

Building materials and furnishing supplies

During school construction or renovation, exposure to hazardous ingredients in building materials results from construction dust and sawdust generation and off gassing after installation. Careful selection of building materials can reduce environmental impacts of construction and lead to a healthier indoor environment as well as reduce future costs associated with replacement. Selection of new school furnishings, such as furniture and carpets, should also be made with an eye to effects on school environmental health.

General guidelines for selecting green building products:[85]

Use durable products and materials:

Because manufacturing is very energy-intensive, a product that lasts longer or requires less maintenance usually saves energy. Durable products also contribute less to our solid waste problems.

Choose low-maintenance building materials:

Where possible, select building materials that will require little maintenance (painting, retreatment, waterproofing, etc.), or whose maintenance will have minimal environmental impact.

Choose building materials with low embodied energy:

Heavily processed or manufactured products and materials are usually more energy intensive. As long as durability and performance will not be sacrificed, choose low-embodied-energy materials.

Buy locally produced building materials:

Transportation is costly in both energy use and pollution generation. Look for locally produced materials. Local hardwoods, for example, are preferable to tropical woods.

Use building products made from recycled materials:

Building products made from recycled materials reduce solid waste problems, cut energy consumption in manufacturing, and save on natural resource use. A few examples of materials with recycled content are cellulose insulation, Homasote®, Thermo-ply®, floor tile made from ground glass, and recycled plastic lumber.

Minimize packaging waste:

Avoid excessive packaging, such as plastic-wrapped plumbing fixtures or fasteners that are not available in bulk. Tell your supplier why you are avoiding over-packaged products. Keep in mind, however,

BEST COPY AVAILABLE

that some products must be carefully packaged to prevent damage—and resulting waste.

Four building materials to avoid

The Institute for Local Self Reliance[86] recommends avoidance of four building materials:

Polyvinyl chloride (PVC) plastic

Commonly called vinyl, PVC is the worst plastic for the environment and human health throughout its lifecycle. Likely the largest material source of dioxin to the global environment, it contains numerous toxins that are released during manufacture, use, and disposal. It is not effectively recycled and contaminates plastics recycling processes. Uses: flooring, wallpaper.

Plywood and chipboards

Plywood and chipboard (including particleboard, fiberboard, and oriented strand board) are often made from materials and methods that endanger the Earth's forests. The wood fiber in these products frequently comes from chip mills and processes, including clear cutting, that are among the most destructive operations currently used by the wood products industry. Uses: flooring, walls.

Materials that off gas harmful pollutants

Solvent-based finishes, paints, adhesives, carpeting, particleboard, and many other building products release formaldehyde and volatile organic compounds (VOCs) into the air. These chemicals can affect workers' and occupants' health as well as contribute to smog and ground-level ozone pollution outside.

Pressure treated wood

Pressure treated wood is saturated with chromium copper arsenate (CCA) and is extremely hazardous to human and environmental health. Arsenic compounds and chromium compounds are recognized human carcinogens, and persistent and bioaccumulative toxic chemicals. Inorganic arsenic compounds also are associated with birth defects, neurological damage, and numerous illnesses. Leaching from the wood, the arsenic contaminates water runoff, soil, sawdust, and anything that touches the wood including the hands and clothes of children.

Chapter 11. Conclusion

Preventing risk and harm to children is a daily goal in Vermont schools. Yet general awareness of the risks related to poor indoor air in schools remains low. Children may encounter many hazardous substances throughout the day just taking part in their routine activities.

Although many school environmental health problems are unnerving to parents, few are actually life threatening. Where truly hazardous situations are discovered, every effort should be made to deal with them quickly. Parents should be notified as soon as possible and school officials should seek outside assistance from the Vermont Department of Health.

Today's knowledge of the harmful effects of human made chemicals in the parts per billion and parts per trillion makes keeping children healthy a large and seemingly overwhelming challenge. Yet there are many small steps every school can take to make school a healthier place for every child.

Forming an informal environmental health working group at your school will get the process started. Using an established indoor air quality improvement program, such as EPA's *Tools for School*, gives the school a method for involving all school personnel.

Dealing with any environmental health problem responsibly involves setting realistic goals and timetables that everyone can agree on. Once you get the process started every step creates an improvement.

There are many relatively easy and low-cost actions that make a big difference right away, including:

- Define all walkways to keep students on concrete and off bare dirt on their way into the school.
- Install outdoor grates for knocking off snow and mud.
- Increase the use of walk-off mats in all entryways. This provides a barrier to keep soils and particulates out of the building, while reducing dusting and mopping needs farther into the building.
- Use triple walled vacuums bags to significantly reduce the amount of particulates escaping from vacuum cleaners, improving air quality and reducing mopping needs.
- Vacuum carpets every day by entrances. Vacuum walk-off mats right after rush hour.
- Sit down with the Material Safety Data Sheets for cleaning products used in the building. Find out what the school is using and look for least-toxic alternatives.
- Stop using pesticides. Alternatives are available and they work.
- Get volatile solvents out as soon as possible. Aerosols, VOC cleaning solvents, and permanent markers should be the first to go. VOCs can trigger asthma and other respiratory problems in sensitive individuals. Replacement of aerosols with cleansers dispensed out of a trigger sprayer will perform equally well, at reduced cost.
- Replace bleach with a concentrated, pH neutral, EPA registered, quaternary-based disinfectant or a hydrogen peroxide based sanitizer. While bleach is a powerful and inexpensive sanitizer, it is a poor cleaner and a highly dangerous product that has no place in schools. Bleach is a respiratory irritant, and when mixed unintentionally with other cleaning products produces toxic fumes.

It is well proven that when we control toxic exposures in the environment, human health directly benefits. Direct actions to control environmental health exposures do have results: for example, millions of homes once burdened with lead-based paints are now safe for children. But, at the same time,

hundreds of thousands of children are still at high risk for lead poisoning.

Hence the goal for lead poisoning prevention becomes targeting scarce resources and efforts to identify hazardous properties and make them safe before a child is poisoned.

This is the same strategy for preventing environmental exposures in school. Preventing harm requires taking action. Every action is in itself an accomplishment.

School environmental health is ultimately a community affair. Successfully working together to gain community support and ownership of school environmental health requires open communication and recognition that a healthy learning environment underlies academic success.

Glossary

See also EPA's *Tools for Schools* for Glossary of Air Handling Unit terms

Acute exposure – A single exposure to a toxic substance resulting in severe biological harm. Acute exposures are characterized as generally lasting no more than a day, as opposed to longer, chronic exposures.

Air particulates – Total suspended particulate matter found in the air as solid particles or liquid droplets. See also Small Particulate Matter.

Allergen – Irritant that provokes an allergic reaction in a person sensitive to that particular material.

ASHRAE – American Society of Heating, Refrigerating and Air-Conditioning Engineers.

Asthma – A chronic immune system disease, characterized by sporadic attacks of shortness of breath, wheezing and coughing.

Body burden – The total amount of a chemical in the body. Some chemicals build up in the body because they are stored in fat or bone or because they are eliminated very slowly.

Carcinogen – Any substance that causes or aggravates cancer.

Cfm – Cubic feet per minute. The amount of air, measured in cubic feet, which passes through a given space in a minute.

Carbon monoxide (CO) – A colorless, odorless, poisonous gas resulting from many combustion processes, including incomplete combustion.

CO_2 – Carbon dioxide, a colorless, odorless gas, exhaled by animals and plants. High CO_2 levels indoors can lead to drowsiness

Chronic exposure – Multiple exposures over time resulting in adverse health effect in which symptoms recur frequently or develop slowly over a long period of time.

Corrosive poison – A type of poison containing a strong acid or strong base causing severe burns to the skin, mouth, stomach, etc.

Deep dust – Dust particles, including heavy metals and viruses, lodged in carpets that are not removed by vacuuming, and often not removed by steam cleaning.

Dermal toxicity – How poisonous a chemical is when absorbed through the skin.

EPA – United States Environmental Protection Agency.

Endocrine disruptors – Synthetic chemicals (and possibly some natural plant compounds) that may affect the endocrine system – the chemical communication system of glands, hormones, and cellular receptors that controls the body's internal functions. Many endocrine disruptors are linked to developmental, reproductive and other health problems in wildlife, laboratory animals, and humans.

Environmental contaminants – Any harmful compounds, including heavy metals, solvents, VOCs, SPMs, PAHs, pesticides, petroleum products, and other compounds associated with negative health effects.

Exposure – Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short term (acute) or long term (chronic).
Flammable – May readily ignite in the presence of a spark or open flame.
Fungi (singular: Fungus) – Molds, mildews, yeasts, mushrooms and puffballs. A group of non-photosynthetic organisms, usually non-mobile, filamentous, and multi-cellular. Many grow in soil; many flourish on damp interior substrates, such as basement floor carpets.
Fungicide – Pesticides used to control, deter, or destroy fungi.
Hazardous substance – Any material posing a threat to human health and the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.
Heavy metals – Elemental metals, including arsenic, cadmium, chromium, lead, mercury and nickel. Ingestion is the major route of exposure. All are implicated in serious human health problems.
Herbicide – Pesticide used to kill unwanted plants.
HVAC system – Heating, ventilation and air conditioning system.
IAQ – Indoor air quality.
Inert ingredients – Pesticide components such as solvents, carriers, dispersants, synergists, and surfactants that are not active by themselves against the target pest. Many inert ingredients are highly toxic.
Ingestion – Swallowing. Chemicals can get on hands, food, drink, and utensils where they can be ingested and subsequently absorbed into the bloodstream.
Inhalation – Breathing or gases, particles, or droplets. Once deposited in the lungs, contaminants can be taken into the blood.
Insecticide – Pesticide compound specifically used to kill or prevent the growth of insects.
IPM – Integrated pest management. A mixture of control strategies aimed at altering habitat, using least toxic methods, and using highly targeted pesticide applications only where other methods are ineffective.
Irritating – Causing discomfort by burning, stinging, tickling, making the eyes water, etc.
Label – The printed material attached to any pesticide or cleaning agent, as in "Always read the label before you use the product." The label may contain signal words: DANGER...POISON, WARNING, or CAUTION.
MCS – Multiple Chemical Sensitivity, a condition in which a person's body has severe reactions to low-level environmental pollutants and irritants.
NIOSH – National Institute for Occupational Safety and Health
Off-gas, off gassing – The emission of fumes from building materials (paints, carpets) or furniture
OSHA – Occupational Safety and Health Administration.
Particleboard – Used as a building or furniture material, these boards are formed by pressing wood chips together with glues. Particleboard is a major source of off-gas fumes.
Parts per million (ppm)/ parts per billion (ppb)/ parts per trillion (ppt) – Units commonly used to express contamination ratios in water and air. Parts per million is often expressed as milligrams per kilogram (mg/kg).
Pesticide – Substances or mixtures intended to prevent, destroy, repel, or mitigate a pest, as well as plant defoliants, growth regulators, and desiccants.
PAH – Polycyclic aromatic hydrocarbon. These molecules are highly carcinogenic and they are also very common. PAHs are a standard product of combustion from automobiles and airplanes and some (such as benzo[a] pyrene) are present in charcoal broiled hamburgers.
Radon – A colorless naturally occurring

radioactive gas formed by radioactive decay of radium atoms in soil and rocks. Radon migrates through the soil and groundwater and can enter buildings through cracks or other openings in the foundation.

Reactive – Will readily combine with other chemicals, often producing a new hazardous chemical.

Sick Building Syndrome (SBS) – Refers to health complaints by building inhabitants relating to indoor pollutants. Symptoms are highly variable and may include eye, skin, and upper airway irritation, headaches, fatigue, dizziness, runny nose, sore throat, allergies, asthma, dry skin, depression and other complaints. Symptoms frequently disappear as soon as sufferers leave the building. Dust and common allergens, unvented office equipment, polluted intake air, and renovation fumes may be significant factors in SBS. Complaints may be localized or spread throughout the building.

Sensitization – Refers to initial or repeated moderate exposure to compounds or agents, resulting in subsequent triggering of immune system response by low levels of similar agents, often out of proportion to actual exposure. Common sensitizers: fragrances, mold, carpet fumes, tobacco smoke and food additives.

Solvent – A substance (usually liquid) capable of dissolving or dispersing one or more other substances.

SPM – Small Particulate Matter – Fine liquid or solid particles such as soot, dust, mist, fumes, or smog found in air and vehicle emissions. SPM is easily inhaled deep into the lungs. These particles are not easily exhaled, and stay inside the lungs for long periods of time, corroding cells and ultimately leading to tumor growth.

Surfactant – Substance reducing surface tension of liquids. An agent such as a detergent or a drug that reduces the surface tension of liquids so that the liquid spreads out, rather than collecting in droplets.

Synergy – The action of two chemicals that produces a greater cumulative effect when the chemicals are used together, than when they are used separately.

Teratogen – Agent affecting the embryo or fetus, including chemicals such as xylene or toluene, or viruses, or ionizing radiation, that interrupts or alters the normal development of the fetus, with results that are evident at birth.

TILT – Toxicant-induced loss of tolerance. The term refers to toxic exposure resulting in the loss of tolerance for common chemicals. Another name for MCS.

Toxic – Poisonous, deadly, injurious to plants and animals.

VOCs – Volatile organic compounds: Chemicals containing carbon and different proportions of other elements that readily vaporize (become gas) at room temperature. VOCs are commonly used as solvents (paint thinners, lacquer thinners, degreasers, and dry cleaning fluids). Many VOCs are toxic and trigger allergic reactions.

Information Resources

A wide variety of information is available via the Internet from federal and state government agencies and from local, state and national organizations specializing in school indoor air quality.

General Information and Links

- **Vermont Public Interest Research Group**: You can link to Internet sites below from VPIRG's web site **www.vpirg.org.** Overview of the healthy schools bill and links to many indoor air quality resources.

- **State of Vermont Act 125 School Environmental Health Site**. Provides a gateway to a wide range of informational materials relevant to school environmental health, including links to resources elsewhere on the Department of Health website and to information offered by other governmental agencies, nonprofit organizations and professional societies. http://www.state.vt.us/health/_hp/airquality/act125/act125.htm

- **U.S. Environmental Protection Agency**. Provides the latest Federally approved information on children's health and environmental hazards, including research, publications, health programs, news items, and links to over 50 organizations. **http://www.epa.gov/children/**

- The EPA Indoor Air Quality (IAQ) Tools for Schools Kit. Recently updated : includes an IAQ Coordinator's Guide and useful checklists for identifying and resolving indoor air quality problems. http://www.epa.gov/iaq/schools/tools4s2.html

- U.S. EPA Indoor Air Facts No. 4 (revised) Sick Building Syndrome (SBS) http://www.epa.gov/iaq/pubs/sbs.html

- Learn about chemicals around your home. http://www.epa.gov/opptintr/kids/hometour/index.

- U.S EPA Office of Pesticides Home page http://www.epa.gov/pesticides/

- ***Blueprint for a Green School***. Chase, Jayni. Scholastic Leadership Policy Research. Scholastic, Inc. New York, NY. 1995. Comprehensive primer on dealing with environmental safety issues in school: basic facts, student and teacher suggested activities, curricula and information resources. Ordering Information: ISBN 0-590-49830-4. Call 1-800-325-6149.

- ***Child Proofing Our Communities—Reducing Children's Environmental Health Risks in Schools, Parks, Playgrounds, Homes, Food and Water***. 2000. Center for Health, Environment and Justice. P.O. Box 6806, Falls Church, VA 22040.

- ***The Healthy Schools Handbook.*** Norma Miller, Ed. 1995. National Education Association of the United States. NEA Professional Library. West Haven, CT. Stock No. 1863-X-00-C4.

- The Healthy Schools Network links page to organizations involved in school environmental health issues. http://www.hsnet.org/internet.htm.

- The Children's Environmental Health Network website provides information on the issue of children's environmental health, and links to sources of information and resources in the field. http://www.cehn.org/cehn/resourceguide/ghome.html.

- The American Lung Association School Programs web page. http://www.lungusa.org/school/.

Building and construction materials

- ***Building Materials: What Makes a Product Green?*** Environmental Building News. Vol. 9, No. 1 Jan. 2000. http://www.buildinggreen.com/features/gp/green_products.html

☐ **Institute for Local Self-Reliance,** 2425 18th Street, NW Washington, DC 20009-2096 http://www.healthybuilding.net/

☐ **Environmental Building News.** Product Reviews. Updated information on environmentally friendly construction and maintenance products. http://www.buildinggreen.com/products/productslist.html

☐ **Best Paints**, 5205 Ballard Ave., NW, Seattle, WA 98107, (206) 783-9938, Brochure of nontoxic paints and sealers. This site is intended as an example of a commercially available environmentally friendly paint source, and does not imply an endorsement from VPIRG.

☐ **Bioshield paints** are made from natural products and are considered low-allergenic. http://www.bioshieldpaint.com/ This site is intended as an example of a commercially available environmentally friendly paint source, and does not imply an endorsement from VPIRG.

☐ **Chem-Safe Products**, P.O. Box 33023, San Antonio, TX 78265, Brochure of custom-made, non-toxic, low-odor paints. This site is intended as an example of a commercially available environmentally friendly paint source, and does not imply an endorsement from VPIRG.

☐ **Green Paint and Chemical Ltd.** , has developed an environmentally friendly process to produce paints that dramatically reduces harmful pollutants released into the atmosphere and improving efficiency. http://pers-www.wlv.ac.uk/~c9663893/ This site is intended as an example of a commercially available environmentally friendly paint source, and does not imply an endorsement from VPIRG.

☐ **Specialized Paints** are distributors of the premium quality, ecologically responsible range of "Phoenix Paints" http://www.powerup.com.au/~metalfix/ This site is intended as an example of a commercially available environmentally friendly paint source, and does not imply an endorsement from VPIRG.

Cleaning and maintenance supply safety

☐ Chemicals in Class*rooms: Pesticides and Maintenance Chemicals in Vermont Schools.* Vermont Public Interest Research Group. Montpelier, VT. January 1999. Survey of pesticides and chemical cleaning supplies. Useful background information on pesticides and schools. VPIRG 802-223-5221.

☐ **Cleaning Solutions For a Healthier Environment** Good example of a commercial provider of cleaning solutions for school settings. 'HEALTHY CLEAN BUILDINGS'® 4 Wilmington Drive Melville, NY 11747 http://www.cleaningpro.com/

☐ **Custodial Products Bid Specifications**: City of Santa Monica, CA. Updated the procurement process for custodial/maintenance products allowing the City to better evaluate the overall worker health and environmental impacts associated with their use. http://www.ci.santa-monica.ca.us/environment/policy/purchasing/bidspecs.htm

☐ **Federal Supply Service**: The GSA Federal Supply Service offers a wide range of environmentally oriented products and services. http://www.fss.gsa.gov/environ/

☐ **Finding Chemical Data about Janitorial Supplies** http://www.westp2net.org/Janitorial/tools/chemicaldata.htm

☐ ***Guidelines for Green Housekeeping and Maintenance,*** Stephen P. Ashkin, for the City of Austin, Texas, Sustainable Building Guidelines, Vol. III, February, 1998. Comprehensive checklists for healthier building for use by facility directors and custodial staff. Contact: Stephen P. Ashkin, Healthy Housekeeping Solutions, 3644 Tamarron Dr.,

Bloomington, IN 47408.

☐ **Green Seal** is the independent, non-profit organization dedicated to protecting the environment by promoting the manufacture and sale of environmentally responsible consumer products. It sets environmental standards and awards a "Green Seal of Approval" to products that cause less harm to the environment than other similar products. http://www.greenseal.org/

☐ ***Healthier Cleaning and Maintenance: Practices and Products for Schools***, Healthy Schools Network, Inc. 96 South Swain St. Albany, NY 12210 (518) 462-0632. This publication focuses on minimizing dirt and grime through the use of preventive maintenance practices, and purchasing healthier, safer cleaning products. A checklist is provided for each of these topics.
e-mail: healthyschools@compuserve.com , website: http://www.hsnet.org/

☐ **Janitorial Products Pollution Prevention Project** ("JP4") posts a series of fact sheets on environmental, health, and safety issues. The fact sheets are meant to provide cleaning tips and health and safety information for individual janitorial workers. Facts sheets on: Toilet cleaning//Hard floor care//Carpet care//Restroom cleaning//Glass cleaning//Metal cleaning//Disinfectants. http://www.westp2net.org/Janitorial/jp4.htm

☐ Massachusetts Environmentally Preferable Products – Product Information http://www.state.ma.us/osd/enviro/products/cleaning.htm

☐ **Minnesota Buildings and General Services Department** – Environmentally Preferable Purchasing (EPP) http://www.moea.state.mn.us/lc/purchasing/index.cfm.

☐ **Polluting Our Future: Chemical Pollution in the U.S. that Affects Child Development and Learning** A New Report by: National Environmental Trust/Physicians for Social Responsibility/Learning Disabilities Association of America http://environet.policy.net/health/neighborhood/cehfuture/

☐ ***Toxic Chemical Exposure in Schools*: Our Children at Risk.** Vermont Public Interest Research Group. Montpelier, VT. March 1998. Overview of chemically hazardous products in use by schools. VPIRG 802-223-5221.http://www.vpirg.org/pubs/background_reports.html

☐ **Vermont State Purchasing And Contract Administration Division Resource Guide** The Division maintains over 400 contracts for a wide range of items used by schools, Towns, and State Agencies. A current list of widely used contracts is available on the Internet at **www.bgs.state.vt.us/PCA/**

Curriculums on the web

☐ Association of Vermont Recyclers homepage http://www.vtrecyclers.org/

☐ **Dusty Air.** Judith Brown 1991 Woodrow Wilson Biology Institute/ Accent Excellence Activities Exchange. http://www.accessexcellence.com/AE/AEPC/WWC/1991/particulates.html.

☐ **K12 Curriculum Resources on the Web.** This web page is designed to help teachers locate curriculum material on the net. http://www.lloyd.com/k12curriculum.html.

☐ **Life Sciences Curriculums on-line** http://unite.ukans.edu/explorer-db/browse/static/Natural^Science/index.html.

☐ **The Plain English Guide To the Clean Air Act** http://www.epa.gov/oar/oaqps/peg_caa/pegcaain.html.

☐ **The Air Currents Project – A Model Curriculum for Environmental Education.** A Teachers Guide for Grades 6 through 12. NESCAUM, 129 Portland St. Boston, MA 02214. (617)367-8540. Contains wide variety

BEST COPY AVAILABLE

of activities and excellent appendices. Requires temporary use of an air-monitoring machine.

☐ **Project Clean Air**. Students investigate air quality, learn how to monitor the air, and learn how air quality is measured. This project serves as an example of the principle that global problems have local origins and that careful monitoring and study of the local environment is the first step in being a global thinker. http://www.gtp.org/aboutcl.html.

Diesel Emissions

☐ *Exhausted by Diesel – How Americas Dependence on Diesel Engines Threatens Our Health* By Gina M. Solomon, Todd R. Campbell, Tim Carmichael, Gail Ruderman Feuer and Janet S. Hathaway. Natural Resources Defense Council. April 1998. http://www.nrdc.org/air/transportation/ebd/ebdinx.asp

☐ American Lung Association of Metropolitan Chicago—*Diesel Trucks and Environmental Health* Available by calling 312-649-3355. Website at http://www.lungusa.org/chicago/programs.html

☐ Clean Air Trust *The Dirty Truth About Big Trucks*, www.cleanairtrust.org/trucks.dirtytruth.html.

☐ State of California. The Toxic Air Contaminant Identification Process—*Toxic Air Contaminant Emissions from Diesel-Fueled Engines* http://www.arb.ca.gov/toxics/dieseltac/factsht1.pdf.

☐ U.S. Public Interest Research Group, *Diesel Trucks and Buses are Polluting Our Air* http://www.pirg.org/cleanairnow/fact.html.

☐ USPIRG. *The Dangers of Diesel*, by Angie Farleigh and Leah Kaplan. July, 2000. http://www.pirg.org/

Health Information on the Web

☐ AIR - Allergy Internet Resources. Allergy and Asthma resources on the Internet http://www.emissary.net/allergy/allabc.html

☐ Allergens: There's something in the air.(common household airborne allergens)(The Allergy Report 1998 - sponsored supplement - American Academy of Allergy, Asthma and Immunology) Author: Thomas A. E. Platts-Mills Issue: March, 1998 http://www.findarticles.com/cf_0/m1511/n3_v19/20324756/p1/article.jhtml

☐ Definition of Asthma. The Children's Mercy Hospital, Kansas City, Missouri. http://www.cmh.edu/asthma/Asthma/Diagnos/Define.HTM

☐ Chemical Exposures: Agency for Toxic Substances and Disease Registry Medical Management Guidelines for Acute Chemical Exposures: Frequently Asked Questions, Patient Information http://www.atsdr.cdc.gov/mmg.html

☐ ***Is This Your Childs World?*** Raap, Doris J, MD. Bantam Books. New York, NY. 1996. Frank discussion of unexplained illnesses, behavioral problems, and learning difficulties caused by sensitivity to substances commonly found in schools.

☐ Managing asthma emergencies for the school teacher...if a child in your school has http://www.lungusa.org/school/asthma_alert.html

☐ **Pathfinders to Consumer Health Questions**. Pathfinders are a time-honored tradition in public libraries. **HEALTH**INFOQUEST pathfinders are designed for public librarians and health information specialists. http://www.nnlm.nlm.nih.gov/healthinfoquest/

☐ **Carpets**: AAL Reference Laboratories, Inc.,1715 E. Wilshire #715, Santa Ana, CA.

Immunologic Tests in Illness From New Carpet Exposure: A Form of Indoor Air Pollution. http://www.aalrl.com/capetdoc.htm.

- **The Chemical Injury Information Network** (CIIN) is a tax-exempt, non-profit, charitable support and advocacy organization run by the chemically injured for the benefit of the chemically injured. It focuses primarily on education, credible research into Multiple Chemical Sensitivities (MCS), and the empowerment of the chemically injured. http://www.ciin.org/

- Harvard University Operations Services – General Fact Sheet Library: Biosafety//Environmental Affairs//Industrial Hygiene//Radiation//Safety http://www.uos.harvard.edu/ehs/factsheets/ehs_bottom_factsheet.html.

- Multiple Chemical Sensitivity: MCS Referral & Resources – Professional outreach, patient support, and public advocacy devoted to the diagnosis, treatment, accommodation, and prevention of Multiple Chemical Sensitivity Disorders http://www.mcsrr.org/

Pesticides

- Integrated Pest Management-An example of a commercial IPM service provider http://www.getipm.com/sitemap.htm.

- *IPM for Schools: A How-to Manual*. Drilk T, Ed. 1977. Bio-Integral Resource Center. P.O. Box 7414 Berkeley, CA 94707. A comprehensive, easy-to-use manual for implementing integrated pest management in schools. Ordering information at. http://www.keyed.com/birc/IPM.htm.

- **National Coalition Against the Misuse of Pesticides**. The Schooling of State Pesticide Laws 2000 – A review of State pesticide laws and schools. http://www.beyondpesticides.org/

- **Northwest Coalition Against Pesticides**: One of the best pesticide information resources on the web. Link to *Unthinkable Risk: How Children Are Exposed and Harmed When Pesticides Are Used at School*. http://www.oag.state.ny.us/environment/schools96.html#results.

- Researching Health Effects of Pesticides on the Web. Kay Rumsey, Librarian, Northwest Coalition for Alternatives to Pesticides, May 2000. http://www.pesticide.org/ResPHealth.html.

- Pest Management at a Crossroads: Up to date information Integrated Pest Management http://www.pmac.net/index.htm.

Appendix A—Act 125, The School Environmental Health Act

NO. 125. AN ACT RELATING TO TOXIC MATERIALS AND INDOOR AIR QUALITY IN VERMONT PUBLIC SCHOOLS

(H.192)

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 1. LEGISLATIVE FINDINGS, PURPOSE AND GOALS

(a) The General Assembly finds that:

(1) There is significant evidence that hazardous chemical exposure and poor indoor air quality can negatively affect human health and productivity.

(2) Problems related to hazardous chemical exposure ranging from complaints of minor illness to death are documented in medical, institutional and governmental studies.

(3) Children are particularly susceptible to adverse health effects from hazardous chemical exposure and poor indoor air quality, as their bodies are undergoing rapid growth and development, their immune systems are not fully functional and they are likely to be in contact with materials not encountered by adults.

(4) A school environment, in which hazardous exposures are reduced and an adequate supply of fresh or filtered air is provided reduces viruses and allergens, increases the likelihood that school students and staff will be more alert and productive and may reduce risk of litigation.

(5) Problems involving potentially hazardous chemical exposure and poor indoor air quality are associated with increased use of manufactured construction materials, energy conservation measures which have sealed school buildings more tightly, inadequate air exchange which fails to eliminate pollutants from inside school buildings, and moisture problems that cause biological growth inside school buildings.

(6) Information on least-toxic and nontoxic materials, nonchemical pest control methods and appropriate maintenance practices and standards is widely available through governmental agencies, nonprofit organizations and professional societies, but is not readily accessible through a single information source.

(b) It is the purpose of this act to direct the department of health, in consultation with other state agencies, to compile and make available to all Vermont schools, information about materials and practices commonly used in school operation and construction that may compromise indoor air quality or negatively impact human health. It is also the purpose of this act to encourage schools, with assistance from the department of health, to develop programs that will enable them to identify and eliminate potentially hazardous materials, isolate those hazardous materials that cannot be eliminated, and adequately ventilate school buildings to exhaust any pollutants and contaminants.

(c) It is the goal of this act that at least 50 percent of Vermont schools qualify for an environmental health certification by January 2005.

Sec. 2. COMMISSIONERS OF HEALTH AND OF BUILDINGS AND GENERAL SERVICES; SCHOOL ENVIRONMENTAL HEALTH WEBSITE

(a) The commissioners of health and of buildings and general services shall jointly create and jointly update as necessary an electronic school environmental health clearinghouse site on the health departments website, including diagnostic checklists and searchable databases. This website shall include:

(1) Information on materials and practices in common use in school operations and construction that may compromise indoor air quality or negatively impact human health;

(2) Information on potential health problems associated with these materials, with

specific reference to children's vulnerability;
(3) Information on integrated pest management and alternatives to chemical pest control;
(4) Information on methods to reduce or eliminate exposure to potentially hazardous substances in schools, including the following:
(A) a list of preventive management options, such as ventilation, equipment upkeep, design strategies, and performance standards;
(B) a list of nontoxic or least-toxic office and classroom supplies, maintenance and cleaning chemicals, building equipment, and materials and furnishings; and
(C) a list of environmental health criteria that schools may use as a decision-making tool when determining what materials to purchase or use in school construction or operations;
(5) The model school environmental health policy and management plan developed pursuant to Sec. 3 of this act.

(b) The commissioners of health and of buildings and general services, education and health, with help from the secretary of the agency of natural resources when appropriate, shall:
(1) Review the information on the school environmental health information clearinghouse at least twice yearly, and update it whenever significant developments occur.
(2) At the request of school officials, assist school environmental health coordinators to identify potential sources of environmental pollution in the school, and make recommendations on how to alleviate any problems.
(3) Annually, organize school environmental health training workshop for school environmental health coordinators and school administrators, and an annual training for school maintenance and custodial staff. The department shall issue certificates of training to participants who successfully complete the workshops.
(4) Publicize the availability of information through the school environmental health clearinghouse.
(5) Provide information and referrals to members of school communities who contact the school environmental health clearinghouse with hazardous exposure and indoor air concerns.
(6) Assist elementary and secondary schools in Vermont to establish comprehensive school environmental health programs, which have all or most of the elements of the model policy developed pursuant to Sec. 3 of this act, to address indoor air and hazardous exposure issues.
(7) Report annually to the house and senate committees on education on the extent of indoor air and hazardous exposure problems in Vermont schools and on the percentage of Vermont schools that have established a school environmental health program or qualified for environmental health certification.

(c) Any information provided shall be based on peer-reviewed published scientific material.

Sec. 3. COMMISSIONERS OF BUILDINGS AND GENERAL SERVICES, EDUCATION AND HEALTH; SCHOOL ENVIRONMENTAL HEALTH POLICY AND MANAGEMENT PLAN; ENVIRONMENTAL HEALTH CERTIFICATE

(a) The commissioners of buildings and general services, education and health shall work with the secretary of the agency of natural resources, as necessary, to carry out the provisions of this section.

(b) On or before July 1, 2001, the commissioners shall develop and distribute to each Vermont school, a model school environmental health policy to be implemented under the direction of the building administrator or his or her designee, and which shall include, at a minimum, the following components:
(1) The formation of a school environmental health committee which may be an

existing safety or maintenance committee, consisting of a cross-section of the school community.

(2) An annual school environmental health audit of the school building and grounds which shall be reported to the commissioner of health.

(3) The compilation of a recommended maintenance schedule and checklist for the school, summarizing when and how maintenance of heating and ventilation systems should occur.

(4) The establishment of a school environmental health management plan consistent with the model policy and plan.

(c) The commissioner of education shall distribute to all Vermont public schools on or before July 1, 2001, a model school environmental health management plan which:

(1) includes mechanisms to resolve hazardous chemical exposure and indoor air quality problems as they occur;

(2) provides suggestions for communicating school environmental health status to building occupants and parents;

(3) implements an integrated pest management and control program to minimize the risk of exposure in the school building and on school grounds;

(4) provides for physical isolation of those toxic materials that cannot be eliminated from the school building or grounds; and

(5) includes policies for emergency response, and incorporates methods to evaluate plan effectiveness.

(d) The commissioners shall appoint and convene an advisory panel to consist of representatives of superintendents, school boards, teachers, principals, parents, school nurses, school environmental health advocates, Vermont Public Interest Research Group, Associated General Contractors of Vermont, Vermont Chapter of the American Society of Heating, Refrigeration and Air Conditioning Engineers, and others to offer advice on the implementation of this act.

(e) The commissioners shall establish an environmental health certificate to be awarded to schools which have demonstrated exemplary progress in addressing indoor air quality and hazardous exposure issues beyond adoption of the model policy and plan described in this section. Criteria for determining such progress shall include but not be limited to:

(1) nontoxic or least-toxic purchasing policies and practices for all school supplies;

(2) minimization of pesticide risk and exposure in school buildings and on school grounds; and

(3) completion of a school environmental health workshop, sponsored or approved by the department of health, by one or more members of the school administration and one or more members of the maintenance staff.

Sec. 3a. BUILDING AND CONSTRUCTION MATERIALS

This act does not authorize any prohibition on the use by schools of any materials, processes or products.

Sec. 4. APPROPRIATION

(a) One new limited service position - school environmental health specialist - is authorized in the Department of Health.

(b) The commissioner of health shall seek federal and other funds available to help implement the provisions of this act.

Sec. 5. EFFECTIVE DATE

(a) Sec. 2(b) of this act shall be effective on July 1, 2001.

(b) The remainder of this act shall take effect on July 1, 2000.

Approved: May 17, 2000

BEST COPY AVAILABLE

Appendix B — Environmental Health Audit Form

Green Building Housekeeping and Maintenance Checklist

Prepared by Stephen P. Ashkin, Healthy Housekeeping Solutions,
3644 Tamarron Dr., Bloomington, IN 47408

Place a check mark in each area that has been evaluated and mark areas that need attention. Use "COMMENTS" for notes. Pay attention to your senses – particularly to what you both see and smell. For the most favorable indoor environment, observe levels of gases, particles, and biopollutants. Housekeeping and maintenance activities must focus first on cleaning for health, and then appearance.

A. BUILDING USAGE, EXTERIOR AND NEIGHBORS

Checked	Needs attention		COMMENTS
		Changes in building usage	
		Construction, renovation or other structural changes	
		Construction, renovation or other changes affecting neighbors	
		Standing water on parking lots or grounds	
		Standing water on neighboring roofs, parking lots or grounds	
		Change in vehicular traffic patterns	

B. BASEMENTS AND CRAWL SPACES

		Moisture or standing water	
		Evidence of biological contamination (molds, mildew)	
		Ineffective drainage or inoperable sumps	
		High level of dust or debris	
		Evidence of insects, rodents or other pests	
		Dirty or ineffective air filters, pumps, back draft dampers or fans	
		Sources of VOCs (e.g. stored chemicals)	
		Noticeable odors	
		Cracks in flooring or foundation	

C. GARAGES, LOADING DOCKS AND SHOP AREAS

		Excessive dust, trash and debris	
		Materials (e.g. paints, chemicals, fuels are organized and VOCs are controlled through adequate ventilation (e.g. direct exhaust)	
		Floors are clean to prevent tracking and floor matting systems are utilized and in good working order	
		Vehicular exhaust is NOT impacting fresh air intakes	
		Dumpster areas are clean and located away from fresh air intakes	
		Evidence of insects, rodents or other pests	

D. STAIRS AND ELEVATORS

		Carpeting and flooring are clean and in good condition	
		Bright work and hand rails are clean and in good condition	
		Steps and landings are clean and free of trash and debris	

BEST COPY AVAILABLE

E. ENTRANCES AND LOBBIES

		Entrance mats and floor grills are clean and in good working order. Furthermore they cover enough to be effective (first 6 to 9 feet)	
		Waste receptacles are cleaned and emptied	
		Carpets are clean and in good condition	
		Hard floors are clean, dust free and in good condition	
		Glass doors, decorative surfaces, mirrors and bright work are clean and in good condition	
		Window coverings (e.g. draperies, curtains) are clean	

F. OFFICES, WORK SPACES, CLASSROOMS AND LIVING AREAS

		Flooring and carpets are clean and in good condition	
		Dust levels minimal. Dusting performed with damp cloths	
		Office partitions (especially if fabric covered) are clean and dust free	
		Ceiling tiles exhibit evidence of water or moisture damage	
		Telephones, door knobs and light switches are clean and disinfected	
		Window and light fixtures are cleaned and operating properly	
		Draperies and blinds are clean and dust free	
		Trash receptacles are accessible and emptied	
		Plants, evidence of insect infestation, and surfaces under plants are clean	
		Evidence of mold, mildew or other biocontamination	
		Evidence of insects, rodents or other pests	
		Self contained heating and cooling unites are clean, free of biocontamination and operating correctly	

G. SPECIAL AREAS (e.g. SMOKING AREAS, POOLS, LABORATORIES)

		Chemicals are stored properly and vented directly outdoors	
		Smoking areas are vented directly outdoors	
		Trash receptacles are accessible and emptied	
		Evidence of mold, mildew or other biocontamination	
		Dust levels are minimal. Dusting performed with damp cloths	
		Flooring and carpets are clean and in good condition	

H. FOOD PREPARATION AND EATING AREAS

		Floors are clean, free of food scraps, debris or any signs of biocontamination, and cleaned at least once daily	
		Floor drains are operating properly	
		Air vents are clean and operating properly	
		All surfaces that come in contact with food preparation are clean, free of food scraps and debris, and cleaned after every meal or use	
		Tables (tops and undersides) and chairs are cleaned and sanitized after every meal or use	
		Washing areas and appliances, cooking and eating utensils are cleaned after every meal or use	
		Trash receptacles are tightly covered and emptied daily	
		Evidence of insects, rodents or biocontamination	

Green Building Housekeeping and Maintenance Checklist

Prepared by Stephen P. Ashkin, Healthy Housekeeping Solutions, 3644 Tamarron Dr., Bloomington, IN 47408

BEST COPY AVAILABLE

I. WASHROOMS, RESTROOMS, SHOWER AND BATH AREAS

		Floors, countertops, basins and toilets are disinfected daily	
		Floor drains are operating properly	
		Noticeable odors or visible biocontamination (mold & mildew)	
		Shower heads, water faucets and toilets are operating properly	
		Soap dispensers are operating properly	
		Vents are clean and operating properly with enough ventilation to keep areas dry	
		Waste containers are emptied daily	

J. MAIL, COPY AND COMPUTER ROOMS

		Equipment is free of dust and debris	
		Floors are clean	
		Air vents clean and operating correctly	
		Waste containers cleaned and emptied daily	
		Light switches and door knobs are clean and free of inks and greases	

K. CUSTODIAL CLOSETS AND STORAGE AREAS

		Area is clean and products are neatly organized	
		Stored equipment is clean. Equipment is cleaned after every use	
		Vacuums fitted with HEPA or appropriate filters	
		Mops in good condition	
		Observe cleaning and stored chemicals for DOT Hazard placards. If hazardous products are stored, further review is necessary	
		Floors should be clean and free of debris	
		Drains and washbasins operating properly	
		Exhaust fans/vents are working properly	

L. MECHANICAL, ATTICS, UPPER AREAS AND ROOFS

		Evidence of water leaks or standing water of roof	
		Dust levels and debris are minimal	
		Evidence of birds, rodents, insects or biocontamination	
		Screens and barriers are in place to prevent pest entry	
		Outdoor air intakes are clean and away from sources of contamination (vehicle exhaust, smoke stacks, etc.)	
		Air handlers and related equipment are routinely inspected and cleaned. Filters are periodically cleaned and replaced	
		Mechanical rooms and air plenums not used for storage	

BEST COPY AVAILABLE

Appendix C. — Draft School Diesel Idling Policy for Vermont Schools

WHEREAS school buses transporting students to _____ School are powered by diesel engines;

WHEREAS the U.S. Environmental Protection Agency has found that exposure to diesel exhaust, even at low levels, is likely to pose a risk of lung cancer, as well as other respiratory risks;

WHEREAS diesel emissions are well documented as an asthma trigger;

WHEREAS air inside the school building begins as air immediately outside the school building;

WHEREAS diesel emissions frequently pervade portions of the _____ School when school buses are idling adjacent to the school;

NOW THEREFORE, _____ School enacts the following policy relating to school buses and diesel delivery and service vehicles:

Section 1. All school buses will warm up their engines at a site away from the school.

Section 2. All buses dropping off and picking up students adjacent to the school will turn off their engines immediately upon arrival at the school and leave engines off until the buses are ready to depart.

Section 3. All delivery vehicles servicing the _____ School will turn off their engines while deliveries are underway,

Section 4. Where engine idling is needed to facilitate the delivery, (such as oil delivery) delivery times will be scheduled before or after school is in session.

References

[1] USEPA, Indoor Air Quality Basics for Schools, EPA-402-F-96-004, Oct 1996.

[2] Irene R. Wilkenfeld, "Poor Indoor Air Quality May Affect Learning and Health," Informed Consent, Nov-Dec 1993, p. 43.

[3] Indoor Air Quality in Selected Buildings, report by the General Accounting Office, GAO/RCED-98-149R, May 1998.

[4] Ott, WR and Roberts, JW. "Everyday exposure to toxic pollutants." Scientific American. FEB. 1998.

[5] Jessica Portner, "Sniffing Out School Illness: Is It in the Air?" Education Week, 18 March 1998, p. 1.

[6] Indoor Air Quality in Selected Buildings, report by the General Accounting Office, GAO/RCED-98-149R, May 1998.

[7] Indoor Air Quality in Selected Buildings, report by the General Accounting Office, GAO/RCED-98-149R, May 1998.

[8] Jessica Portner, "Sniffing Out School Illness: Is It in the Air?" Education Week, 18 March 1998, p. 1.

[9] Irene R. Wilkenfeld, "Poor Indoor Air Quality May Affect Learning and Health," Informed Consent, Nov-Dec 1993, p. 43.

[10] Richard Laliberte, "Breathing Uneasy: The Truth About Sick Building Syndrome," Health Magazine, Sept 1990, p. 63.

[11] Irene R. Wilkenfeld, "Poor Indoor Air Quality May Affect Learning and Health," Informed Consent, Nov-Dec 1993, p. 43.

[12] USEPA, Indoor Air Quality Basics for Schools, EPA-402-F-96-004, Oct 1996.

[13] Peter Sterling and Nicole Paquette, "Toxic Chemical Exposure in Schools: Our Children at Risk," Vermont Public Interest Research Group, March 1998.

[14] Report of the Subcommittee on School Buildings, Committee on Indoor Air Quality in Schools and Public Buildings, State of Vermont, 19 July 1999.

[15] Ed Barna, "MUHS Board Sees Problems Mounting," Rutland Daily Herald, 20 Nov 1992.

[16] Yvonne Daley, "School Air Quality Is Probed," Rutland Daily Herald, 12 Jan 1993.

[17] Miller, NL. *The Healthy School Handbook*. 1995. National Education Association of the United States. Washington, DC.

[18] Irene R. Wilkenfeld, "Poor Indoor Air Quality May Affect Learning and Health," Informed Consent, Nov-Dec 1993, p. 43.

[19] Peter Sterling and Nicole Paquette, "Toxic Chemical Exposure in Schools: Our Children at Risk," Vermont Public Interest Research Group, March 1998.

[20] Weisglas-Kuperas N, Pantandin S, Berbers G, Sas T, Mulder P, Sauer P, Hooijkaas H. 2000. "Immunologic effects of background exposure to polychlorinated biphenyls and dioxins in Dutch preschool children." Environ. Health Perspect. 108:1203-1207.

[21] American Lung Association. Selected Key Studies on Particulate Matter and Health: 1997-2000. September 2000.

[22] Mari S. Golub. California Regional Primate Research Center, University of California Davis, Davis, California, USA. Environ Health Perspect 108:355-362 (2000) http://ehpnet1.niehs.nih.gov/docs/2000/108p355-362golub/abstract.html

[23] Peter Montague, "Asthma: Prevention May be the Only Cure," Rachel's Hazardous Waste News, no. 374, 27 Jan 1994.

[24] Alyssa Burger, "Is Air Pollution to Blame for the Asthma Epidemic?" E Magazine, Nov-Dec 1996, p. 42.

[25] Institute of Medicine, "Indoor Allergens: Assessing and Controlling Adverse Health Effects", 1993, as cited by USEPA in *Asthma, Air Quality, and Environmental Justice: EPA's Role in Asthma Education and Prevention*, July 1995, EPA-402-F-95-001.

[26] Peter Montague, "Asthma: Prevention May be the Only Cure" Rachel's Hazardous Waste News, no. 374, 27 Jan 1994.

[27] *Childhood Asthma: A Matter of Control*, pamphlet, American Lung Association, Feb 1992.

[28] Burger AL. "Is Air Pollution to Blame for the Asthma Epidemic?" E Magazine. November/December 1996.

[29] *Facts About Asthma*, pamphlet, American Lung Association, May 1996.

[30] Peter Montague, "Asthma: Prevention May be the Only Cure," Rachel's Hazardous Waste News, no. 374, 27 Jan 1994.

[31] *Multiple Chemical Sensitivities: Definitions, Facts, and Statistics*. Colorado Health Net. http://www.coloradohealthnet.org/site/idx_mcs.html

[32] Miller CS. "Toxicant-Induced Loss OF Tolerance--An emerging theory of disease?" Environmental Health Perspectives. VOL. 105 Supplement 2, March 1997.

[33] Peter Montague, "A New Mechanism of Disease?" Rachel's Environment and Health Weekly, no. 585, 12 Feb 98.

[34] *In Harms Way*. Greater Boston Physicians for Social Responsibility. 2000. http://www.preventingharm.org/harmswayreadmore.html

[35] *Polluting Our Future: Chemical Pollution in the U.S. that Affects Child Development and Learning*. National Environmental Trust, Physicians for Social Responsibility and Learning Disabilities Association of America September 2000 http://environet.policy.net/health/neighborhood/cehfuture/contents.html

[36] Needleman HL, Riess JA, Tobin MJ, Biesecker GE and Greenhouse JB. "Bone Lead Levels and Delinquent Behavior." Journal of the American Medical Association. February 7, 1996; 275(5):363-369.

[37] Needleman HL and Gastonis CA. "Low-Level Lead Exposure and the IQ of Children A Meta-Analysis of Modern Studies." Journal of the American Medical Association February 2, 1990; 263(5):673-78.

BEST COPY AVAILABLE

[38] Bellinger D, et al. "Low-Level Exposure and Children's Cognitive Function During the Preschool Years." Pediatrics 1991;87(2):219-227.
[39] *Solvents: a threat to workers and their children.* Workers Health and Safety Center. Don Mills, Ontario. http://www.whsc.on.ca/SERVICES/hazardbullerinsspr2000/solvents.htm
[40] Norback D. 1990. *Environmental Exposures and Personal Factors Related to Sick Building Syndrome.* Uppsala University. Uppsala, Sweden. Pp 41-48.
[41] *INDOOR AIR POLLUTION: An introduction for health professionals.* 1994. American Lung Association, American Medical Association, U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency.
[42] Vermont Department of Health, Division of Health Protection, *Indoor Air: Mold.* April 1998.
[43] Laliberte R. "Breathing Uneasy: The Truth About Sick Building Syndrome," Health Magazine, Sept 1990, p. 63.
[44] Indoor Mold and Children's Health. Environmental Health Perspectives Volume 107, Supplement 3, June 1999.
[45] *INDOOR AIR POLLUTION: An introduction for health professionals.* 1994. American Lung Association, American Medical Association, U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency.
[46] Anderson Laboratories, Inc. *Some Carpets, Some mice–Carpet Studies,* West Hartford, VT. 8/95.
[47] Indoor Air Pollution Fact Sheet: Carpet, American Lung Association, Nov 1992.
[48] Warner J. *Allergic Diseases and the Indoor Environment.* University of Southampton, Eng. July, 2000.
[49] California Environmental Protection Agency. Air Resources Board. *Toxic Air Contaminant Emissions from Diesel-fueled Engines.* October 1998.
[50] National Resources Defense Council. *Exhausted by Diesel.* April 1998. http://www.nrdc.org/air/transportation/ehd/ehdinx.asp
[51] *Diesel Fumes Could Carry Cancer Risk, EPA Reports Low-Level Exposure Linked to Ailment.* Washington Post, April 10, 1998: A11.
[52] Schettler T, Solomon G, Valenti M, Huddle A. *Generations at Risk.* 1999. MIT Press. Cambridge, MA.
[53] The New Encyclopedia Britannica, 15th ed., Micropedia, 1989, vol 8, pp. 124 and 228-9.
[54] Raap DJ, MD. Is This Your Childs World? Bantam Books. New York, NY. 1996.
[55] ESEPA Indoor Air Quality Tools for Schools Kit. Building and Maintenance Checklist. http://www.epa.gov/iaq/schools/tfs/building.html#moisture_leaks_and_spills.
[56] Marron M, Knoeppel H, Righetti S. 1987. "Occupational and environmental exposure to pentachlorophenol." Report EUR10795 EN. Luxembourg Office for Official Publication of the European Communities.
[57] Roberts JW, Camann DE, Spittler TM. 1991. "Reducing lead exposure from remodeling and soil track in older homes". In: Proceedings of the Annual Meeting of Air and Waste Management Assoc. Vancouver. BC Vol 15.-134.2.
[58] Galvin DV, Moore RK. 1982. *Toxicants in Urban Runoff.* Metro, Seattle.
[59] Rotard W, Christmann W, Lattner A, et al. 1987. "Occurrence of PCDD and PCDF in rerefined oils and contaminated soils." Chemosphere. 16:1847-1849.
[60] Roberts J. "Reducing Health Risks from Dust in the Home". Chapter 6. Master Home Environmental Training Manual. The American Lung Association. Seattle. 1997. Editor, P Dickey.
[61] *INDOOR AIR POLLUTION: An introduction for health professionals.* 1994. American Lung Association, American Medical Association, U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency.
[62] Bellinger D, Sloman J, etal. "Low Level Lead Exposure and Children's Cognitive Function in the Preschool Years." *Pediatrics* 1991; 87:219-27.
[63] The Facts About Vermont's Lead Poisoning Prevention Act. http://www.state.vt.us/health/act165.htm July 1997.
[64] U.S. Geological Survey. *The Geology of Radon.* http://sedwww.cr.usgs.gov:8080/radon/georadon/2.html.
[65] *INDOOR AIR POLLUTION: An introduction for health professionals.* 1994. American Lung Association, American Medical Association, U.S. Consumer Product Safety Commission, U.S. Environmental Protection Agency.
[66] U.S. Environmental Protection Agency. *Tools for Schools* IAQ Coordinators Guide. May 1995.
[67] Research Triangle Associates, "Evaluation of Exposures to Volatile Organics Off gassing from New Carpets", Feb 1992, RTI report number 94U-4479-001/12-F.
[68] *Indoor Air Pollution Fact Sheet: Carpet,* American Lung Association, Nov 1992.
[69] Rothenberg SJ, Nagy PA, Pickrell JA, Hobbs CM. 1989. "Surface area, adsorption, and desorption studies on indoor dust samples". Am Ind Hyg Asso J 50(1):15-23.
[70] Adgate JL, Buckley TJ, Chow JC, Watson JG, Rhoads GG, Lioy PJ. 1998. "Chemical mass balance source apportionment of lead in house dust". Env Sci Tech 32(1):108-114.
[71] *A New Chlorine-free Competitor to Vinyl Flooring.* Environmental Building News. Volume 7, No. 10 – November 1998. http://www.buildinggreen.com/products/stratica.html

[72] *Troubling Bubbles: The Case for Replacing Alkylphenol Ethoxylate (APE) Surfactants.* Philip Dickey, Washington toxics Coalition, 1997.

[73]Anderson, RC, and JH Anderson. *Toxic Effects of Air Freshener Emissions.* Archives of Environmental Health. November/December 1997 Vol.52 (No. 6).

[74]Nelson WC, Wallace LA. *Identification of Polar Volatile Organic Compounds in Consumer Products and Common Microenvironments.* U.S. EPA March 1, 1991.

[75] Mary Lamielle, "Taking Action: What You Can Do If Your School Building Is Sick," from The Healthy School Handbook, National Education Association, 1995.

[76] Cushman, JH, Jr. "New Toxins Suspected as Cancer Rate Rises in Children" New York Times. September 29, 1997.

[77] Porter WP, Jaeger JW, Carlson IH. "Endocrine, immune, and behavioral effects of aldicarb (carbamate), atrazine (triazine) and nitrate (fertilizer) mixtures at groundwater concentrations". *Toxicology and Industrial Health.* 1999. 15(1-2).

[78] U.S. Environmental Protection Agency. *Overview of Chlorpyrifos Revised Risk Assessment.* June 2000.

[79] Raap, Doris J, MD. *Is This Your Childs World?* Bantam Books. New York, NY. 1996.

[80] USEPA, *Tools for Schools;* IAQ *Coordinators Guide,* EPA 402-K-95-001, May 1995.

[81] "Carbon Monoxide and Carbon Dioxide: Understanding the Differences", A.R.T.ifacts, A.R.T. Studio Clay Company Newsletter, Nov 1993.

[82] Report of the Subcommittee on School Buildings, Committee on Indoor Air Quality in Schools and State Buildings, State of Vermont, 19 July 1999.

[83] Ibid.

[84] Carbon Monoxide and Carbon Dioxide: Understanding the Differences, A.R.T.ifacts, A.R.T. Studio Clay Company Newsletter, Nov 1993.

[85] ***Building Materials: What Makes a Product Green?*** Environmental Building News. Vol. 9, No. 1 Jan. 2000 http://www.buildinggreen.com/features/gp/green_products.html

[86] Institute for Local Self-Reliance, 2425 18th Street, NW Washington, DC 20009-2096 http://www.healthybuilding.net/.

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)

NOTICE

REPRODUCTION BASIS

☑ This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☐ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").